# The Builder.

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## "Social Science."

THE "Social Science Association" labours under a certain disadvantage. It is one, it may be, of annually decreasing importance, but yet it is not altogether to be overlooked. It is one, moreover, which it is easier to point out than to remedy. It is the want of a name that should be at once appropriate and distinctive. A certain group of questions, of the utmost social importance, is gradually elucidated by discussion. But we are yet far from arriving at a result worthy of the name of science, and when sanitary organisation, educational organisation, criminal legislation, and the other subjects on which such valuable information is now being collected, shall have attained a development corresponding to that of the physical sciences, the respective students and doctors of these important branches of politics will be even less likely than at present to consent to their amalgamation under an inappropriate title.

In fact, the term "Social Science" has the objectionable character of ambiguity. The subject of the study lies half-way between two widely distant systems of philosophy, to neither of which it properly belongs. It looks backward towards the "politics" of Aristotle, and forward, or at least sideways, towards the "biology," or sixth science, of Comte. But the practical aim of the discussions at Birmingham is as unlike that of the final chapters of the *Physique Sociale*, as it is to the clear synthetic argument of the Stagyrite. Of the two, it holds much closer to the Greek than to the French method. The doctrine of Aristotle as to the State, and the rights and duties of the citizen, is reduced to that clear and systematic form which was proper to a mind that conceived of all exact knowledge under the general term of "mathematics." But while stating and demonstrating his propositions with all the rigidity of Euclid himself, Aristotle does not evolve his political doctrine from his own ideas of primary principles. He travelled much, observed much, and compared and classified all that he saw, before he wrote. He studied the working of the politics of his day before he spoke of the laws which regulated their working. The treatise of Aristotle was founded on the best statistics that he could procure; and that great philosopher adds to his other claims to the primate's throne of the human intelligence that of having been the first statistician, as well as, in spite of the disingenuous efforts of Bacon to deprive him of the title, the first inductive discoverer. The main difference between a treatise on political principles written to-day (if by such a pen as that of the Stagyrite) and the Greek acroatic lectures, is to be found in the increase in the number of facts to be mastered. When the number of 50,000 inhabitants was regarded as the limit of a city, even Aristotle himself was unable to exhaust the case of a metropolis containing 3,000,000 of souls. In all that relates to the position of man as the questioner and compeller of nature, the greater part of the civilised world of the time of Aristotle could be replaced out of the surplus population of our European cities, without the fact becoming known to the busier portion of the population.

England in 1868, then, differs from Athens in the age of Aristotle, to an extent that may be measured by the lapse of so long a chronological period. Where the Attic philosopher thought of thousands, we have to think of hundreds of thousands, if not of millions. But that part of the political science which depends on the stability of human nature remains unchanged. The ethics of the Greek master are as true to the life of to-day as to that of the age of Alexander. True it is, that the ablest writers on political science have dipped their pens in the inexhaustible source of Greek philosophy, and have been for the most part successful in their dealing with the facts of their own day, in proportion to their acquaintance with the course and the records of history.

The great French writer, on the other hand, looks at sociology from an opposite point of view. He will not allow the name of science to a tentative process, such as all our political action must long continue to be. He requires the student to exhaust the knowledge of the phenomena of inorganic existence, before acquiring that of the phenomena of organised bodies. This latter study—organic physics—he divides into the phenomena which concern the individual, or physiology; and those which concern the species, or sociology. At this last of all possible sciences man can only duly and satisfactorily arrive, after passing through the simpler studies. Thus it is only at some long distant and indefinite future that the positive philosopher can hope to arrive at the point where the basis of Social Science can be laid. And if we remember that M. Comte considers the mastery of any science to be unattained until the power of prediction is grasped by the student (as in the case of eclipses in astronomy), we must confess that all the positive writing on sociology intimately partakes of the nature of a shot in the dark.

Now, we hold that the aim and the useful upshot of such associations as that to which other references will be found in our columns, is very opposite to that of the positive philosopher. Nor do they properly include that political science which is historical in its character. An estimate formed, for instance, from an exhaustive view of the history of Spain, as to the course of the present revolution, would be out of place at Birmingham. Yet nothing would come more strictly within the province of the real political student. The part to be played by our Birmingham fellow-labourers is distinct from that of either of the above-named philosophers. We hold that part to be of no inferior importance, and to be especially germane to the genius of the English people. The main point is the collection of facts, the acquirement of knowledge that is positive, not in the sense in which that word is used by a school, but in that of the ordinary vernacular. It is not the object of the Association to support particular theories. We might say that it is not its object to arrive at theories; were it not that the apprehension of that true and ultimate theory which explains the law of facts is a necessary step in the perfection of knowledge.

The object, then, of such association is to curtail the province of opinion. It is to substitute the knowledge of what is known for the knowledge of what is thought or taken for granted. Opinion, after all, is only another name for ignorance. No person has any opinion as to the problems of Euclid. If one were to hear any individual express an opinion unfavourable to the truth of the forty-seventh proposition of the first book, it would not be the intellectual character of Euclid that would be in jeopardy. Now there are many subjects of the utmost importance to our social welfare the leading principles of which are as fixed as the relations of the containing sides and the hypothenuse of a right angle, as to which nine people out of ten have not yet gone beyond the state of opinion. Many people have "opinions" as to inconvertible bank-notes. That is a case in point. It is one on which "opinion" means ignorance. Again, there are many other no less important points on which the most advanced of us are still in a state of "opinion." The vital question of the disposal of the sewage of great cities and towns is one of these. Our positive knowledge of facts is not yet quite such as to allow us to lay down absolutely the general principles on which this problem should be everywhere solved. But, mean time, there is much to be done by way of clearing the ground. In every science, as in every art, the first step to progress is, to know what is known. An immense amount of working power is frittered away from the simple fact that minds naturally fitted to originate, to improve, or to combine, are left in ignorance as to what has already been discovered in the province with which they seek to deal. Biography is full of instances of the kind, such as that of Ferguson, the astronomer. Those conversant with the business of the Patent Office are pretty fully aware how often the same discovery has been made and remade by persons entirely ignorant of the labours of their predecessors. They are also aware how often the same pseudo-discovery has been made,—how often an inventor has devoted years of life and hundreds of pounds to the prosecution of some supposed improvement, the design of which cannot be put on paper without evincing an entire ignorance of mechanical law. In such struggles in the dark the mind of the inventor may indeed acquire a rough and useful schooling, but, had the efforts thus made been preceded by the knowledge of how much was already known on the subject, the results would no longer have been purely subjective. It is society that is the greatest sufferer by the non-education of powerful and original minds.

In meeting that great want of the day, a want more obvious in our own country than in the more systematically educated parts of Europe, the association to which we refer has an important function to fulfil. To bring out clearly and distinctly into the light of day the actual state of the main questions affecting man as a citizen, is a far nobler task than to legislate, as we now do, from hand to mouth. The proudest triumph of a party leader is paltry and contemptible, when compared with the triumph of him who fully, clearly, and irresistibly first demonstrates a new truth. The minister may command his majority, or the opposition leader may overthrow the cabinet, by an effort of what we complacently call Parliamentary eloquence. What is the result? A. draws the quarter's salary which B. would otherwise have received. Ten or twenty years hence who cares which was which? But the man who clearly demonstrates a scientific truth, before unknown, obtains a triumph that endures for ever. True, his name may be forgotten, but his work abides. He has laid down a new stepping-stone for the human mind through the slough of ignorance. He has won a new district, be it large or small, from the cloudy and indistinct regions of opinion, and added it to the *terra firma* of real knowledge. Truth, once grasped by the individual mind, may, indeed, remain uncommunicated, and thus fail to benefit mankind. But truth when not only grasped, but clearly and plainly enounced and co-ordinated with other truths, is a permanent gain to the race.

In no group of social questions is this advance from the state of opinion to that of knowledge more discernible than in those which relate to sanitary regulations. What was the state of public opinion on this subject when the cholera

first visited our shores, some five-and-thirty years ago? What is it now? When we find, as was stated at the meeting, an undrained, unwholesome, uncleanly nook in the midst of a thriving town, and when a visitor calls attention to the fact, how is the announcement met? By the assurance, whether correct or incorrect we will not stop to inquire now, that the subject is on the very point of receiving some attention! How would Birmingham have greeted such an interference from a stranger in 1834? By a recommendation to mind his own business, and by an assertion that the midden-heap was as salubrious as it was convenient and prescriptive. The difference in the mode in which the subject is regarded is simply owing to the dissemination of exact knowledge on the subject. Opinion, indeed, is not yet altogether routed and destroyed. The cesspool and the midden-heap have still their patrons. It is likely to be long before a single abuse or evil that existed when the nineteenth century was young, will fail to find some advocates to palliate or to excuse it. But the majority of reading people have ceased to hold opinions on the subject. They *know* that the absence of sewerage means the presence of ill-health. They do not discuss; they seek to act. And, although the subject is yet very far from having arrived at a satisfactory state,—although the questions of river pollution, of earth-closets, of defecation of sewage, of surface- or sub-drainage, of rainfall, and the like, yet require much thoughtful study, we are yet gradually disseminating the knowledge of the truth that uncleanliness involves ill-health.

The same rule applies to the discussion of all questions that, to the exclusion of party squabble, are truly political; that is to say, that regard the well-being of man as a member of a community. Their principles are for the most part eminently simple; yet, simple as they are, they are so obscured by the mist of passion or of prejudice, that they have long formed the battle-ground of opinion. Gradually this must disappear. The first step is the collection of facts; the second is their due co-ordination,—a co-ordination which may be tested by the circumstance that anomalous and long-misunderstood facts find their explanation under the general theory. Then comes the dissemination of truth. Old "opinion" passes into the decrepitude of "old-fashioned prejudice," and the work of amendment becomes complete.

Thus to collect and thus to distribute the knowledge of what is known is the self-imposed task of the members of the Association. They may call themselves students of social science: they are labourers in the great field of political economy, or rather of œcumenical politics, who deserve well of their fellow-citizens for their care of the common weal. But their work deserves to be called œcumenical rather than political, since it regards not the special interest of the individual state so much as the general welfare of the habitable world.

## SCIOGRAPHY.

A HUNDRED and fifty years ago the learned few who knew there was such a word as Sciography in the world of words, attached a different meaning to it from that it represents in the present day. It was explained at that time as a profile or platform, or the first rude draught of a thing. It also represented the art of dialling or of showing the time of the day by shadows; and astronomers used it to express the art by which they found out the hour of the day or night by the shadow of the sun, moon, or stars. As far as it concerned architecture it simply meant the profile mentioned above, now called an outline, or a section, then described as "the draught of a building cut in its length or breadth, to show the inside of it, as the conveyance of every room, with the thickness of the walls, timber works, floors, vaults, &c." So lately as the period of the compilation of Rees's "Cyclopædia," sciagraphy and sciography are both explained as "the profile, or section, of a building to show the inside of it." As with many scores of English words, however, we have sifted and shifted the meaning of these kindred terms, and they are not now by any means so interchangeable. Profile, in the architectural world, is extinct, though it still flourishes in the portrait-painter's studio; platforms, too, have vanished from the modern draughtsman's vocabulary, enticed, perhaps, by the high office held out to them at public meetings; and sciography no longer means the outline of a building, but the outline of the shadows that are cast from that building. As precision of terms is one means of progress, as well as one sign of it, we may congratulate ourselves upon being on the right road.

We have before us a work on this science of the projection of shadows by Dr. Puckett.* He tells us most of his text and many of his diagrams were prepared as blackboard lessons for the students of the Bath School of Art who are under his instruction. No progressive text-book being at hand, he called upon his own resources; and, aided by hints derived from the lectures on perspective at the Royal Academy by the late Professor of Perspective, J. P. Knight, R.A., and by thoughts suggested by Dr. Brooks Taylor's more advanced work upon the same subject, he has endeavoured to fill up this void for other teachers and pupils by placing his lessons in their hands. Before a student is in a position to be benefited by our author's labours he must be familiar with linear perspective; sciography, from its very nature, cannot be more than a supplement to perspective. But to architectural students his work is likely to be of great use, as errors in shadows, their spendthrift profusion, and the idle withholding of them altogether are as pitfalls in their paths, into which they must certainly fall without a sound knowledge of the principles that govern them.

Dr. Puckett lays down the primary laws of shadows in these plain terms:—

"The direct shining of the sun, or other luminous body, is in the form of rays, or thin ethereal lines, each acting independently of the other; no such separation of parts is observable in common circumstances, in consequence of the diffusive properties of the atmosphere.

When the medium in which the rays of light move be of uniform density, they will always spread in straight lines from the luminous body which produces them.

In consequence of this directness, a shadow or darkened spot is observable behind any opaque object presented to the light. During night, we are in the earth's shadow; and this shadow reaches so far beyond us into space, that when the moon plunges into it in her course, she undergoes an eclipse.

In proportion as light advances from its seat of production it diminishes in intensity. The ratio of diminution is agreeable to that which governs physical forces—*i.e.*, the intensity of the light will diminish as the square of the distance increases, or at the rate of 1, 4, 16, &c. But in proportion as we lose in intensity, we gain in volume; the light is the weaker the further it is from the candle, but it is filling a wider space. This continual receding of the rays of light from each other, as the word implies, forms radii, proceeding from a centre."

Notwithstanding this radiation, the sun's rays, owing to the immensity of space they traverse, are conventionally divested of their almost imperceptible divergence, and considered to be parallel to each other. In accordance with this accepted fiction, the first lesson to be worked out by the student is proof of the fact that "when the direction of the sun's rays to the plane of delineation is parallel to that plane, lines that represent rays of light must be drawn parallel to one another." Two corollaries are deduced from the problem in which this statement is proved: first, the shadow on a plane of any point must lie on the intersection with that plane of one containing the ray of light that casts the shadow; and, secondly, shadows thrown by lines upon planes parallel to such lines vanish to the vanishing point of the plane on which the lines lie. From this elementary platform, if we may use the expression, the pupil steps upwards to the consideration of more intricate shadows. Sometimes he is placed with his back to the sun, sometimes with his face to the great luminary, sometimes he is placed immediately under it so that its rays pour down upon his devoted head; and in all these varied circumstances he is instructed to take due note of the immutable mystery and certainty of the projection of shadows. There are twenty lessons in all, leading from shadows from planes, oblique and otherwise, and upon them, to shadows upon and from curvilinear and spherical surfaces. This is the mode in which shadows are thrown upon and form oblique planes. A truncated pyramid placed in perspective, making angles of 45° with the plane of delineation, casts a shadow upon an oblong figure with a gabled apex that is placed at a more acute angle with the plane of delineation, which, in its turn, casts a shadow upon the ground. It is necessary, to delineate the proper projection of these shadows, after determining the azimuth and the altitude of the sun, to find the axis of the pyramid. The student is then directed to draw a line by the vanishing point of the sun's rays upon the ground until it is intersected by the ray of light from the luminary containing the apex. At its intersection with the vertical plane he is to draw a perpendicular line meeting the ray of light that tips the apex of the pyramid; and then lines drawn by the vanishing point of the sun's rays upon the horizontal plane through the corners of the base of the pyramid, and cutting the vertical face of the block, and carried to that just mentioned, will give the form of shadow. Without the author's diagrams, and his references to them, the process is more difficult to follow than with those aids. We must add, however, the vanishing point for the shadow thrown by the axis of the pyramid upon the oblique plane is obtained by the intersection of a line joining the accidental vanishing point of the oblique plane with V. P. 3, with the vertical trace of the sun's rays upon the plane of delineation. The shadow upon the ground is obtained by lines drawn by the vanishing point of the sun's rays upon the ground, and cut by rays through certain points not to be indicated without the diagram.

By the time he has arrived at the seventeenth lesson the pupil is assumed to be proficient enough to understand the mode of finding shadows thrown by artificial light in the interior of rooms. Here we have a diagram showing a chamber, with a bookcase and a box in it, and a square plane suspended from the ceiling, with strong lights and shadows playing upon the whole. Dr. Puckett explains that the shadows cast by an artificial light are governed by the same principle as those that are cast by the sun, viz.: "the union of the luminary, the vanishing point of the plane receiving the shadow, with the trace of plane throwing the shadow." The luminous point, however, is always represented before the spectator. After going through all the shadow lines, and the means by which their exact position is ascertained, the author sums up with a remark to the effect that "the vanishing point for a shadow must be found upon the trace of the plane receiving the shadow; and the intersection upon this trace, obtained by the ray of light passing from the luminary to the vanishing point of line throwing the shadow will be the shadow's vanishing point." The eighteenth lesson brings us to the subject of reflections.

Whilst we are looking through the chapter on reflections, our author permits us to imagine ourselves seated in a boat on a lake, with the glorious hills and sky reflected in the water around us,—a delicious privilege for weary students, for which they will gratefully thank him. Leaving them to contrast the brown rippled shadow of the boat with the radiant reflections of the light-clouded sky, we will make our more sombre way after Dr. Puckett. This is a sample of the way he treats his subject:—

"While the painter can scarcely be expected always to work out every appearance of nature with mathematical precision, the laws that govern such appearance should at least be thoroughly apprehended by him, that he may more closely imitate nature in all her diversities, and by the application of her laws be able to test the correctness of his work.

Light is diffused around us by the refractive power of the atmosphere, and therefore objects are quite visible though the rays of the sun do not strike directly upon them. The atmosphere being thus a vehicle of light, the rays of the sun must be regarded as travelling through immense regions of darkness before they reach our atmosphere, where they become diffused into that universal soft light which we observe around us. But besides being diffused by a pure atmospheric medium, light is greatly enhanced in brilliancy by reflection. If all the objects on the surface of our planet were to be black, which is the negation of all colour, the sun's light would be absorbed, or at least return no part of the rays which fell upon them, and we should, even while the sun shone, possess much less light than we now enjoy. Nature has avoided this calamity, and by producing all varieties of colours in objects, the sun's rays which fall upon them are less or more reflected or thrown back into the general mass of light. We, then, understand that any object we see reflects rays of light, and that these rays travel from the object to our eye as soon as we bend our vision upon it. Inasmuch, however, as a thousand or more individuals may see the same object at the same instant of time, it is evident that the rays proceed at all points, and fall upon eyes at every variety of angle."

Thus it will be seen that though it is impossible to say anything entirely new of facts that are, if not as old as Time, at least as old as our terrestrial globe, though only known to man after ages of self-culture, it is possible to state those facts in a plain manner easy to remember and understand, and that the author has done so. The students left in the boat are further told that a ray of light darting downwards in an exactly perpendicular direction to the surface of the lake will be thrown back in the exact path which it traversed in its descent, while another descending in an oblique manner will not return to the place whence it came, but will be reflected at

* Sciography; or, Radial Projection of Shadows. By R. Campbell Puckett, Ph.D., Head Master of the Bath School of Art. London: Chapman & Hall, 193, Piccadilly. 1868.

an angle exactly equal to that at which it descended upon it. The first-mentioned ray, or that striking the reflecting surface, is called the incidental ray; the last-mentioned, or that which is returned from the reflecting surface is called the reflected ray. Further, the angle made by the incidental ray with a perpendicular to the reflecting surface, called the angle of incidence, is equal to the angle made by the reflected ray, with the same perpendicular line, called the angle of reflection; and this fact affords a method of universal application by which, when the angle of incidence is found that of reflection is obtained.

The nineteenth lesson shows the method adopted of finding reflections upon a vertical surface, as a looking-glass. The pupil is required to understand that reflections upon plane surfaces always lie in planes at right angles to such surfaces, and contain the object throwing the reflection. To this end a mirror is drawn and a vase and frame placed sufficiently near it to be reflected upon it. Then follows the lineation which determines the position and extent of the reflections. The twentieth lesson illustrates the principles of reflection upon oblique plains. A lighted candle in a candlestick standing on a couple of books is placed before a swing looking-glass, the mirror of which is in an oblique direction forming an angle with the horizontal plane. The figures are placed at angles of 60° and 30° with the plane of delineation. As reflections always lie in planes perpendicular to the reflecting surface, it is necessary to find a vanishing point at right angles to the oblique plane. Our author then draws a line representing the trace of a plane upon the oblique surface of the mirror, which he continues until it cuts the produced axis of the candlestick. Then, he says, as the apparent distance of reflection behind the plane reflecting surface is always equal to the distance of the object from the reflecting surface, an angle must be constructed equal to that produced by the trace and the axis on the other side of the trace, the outermost line of which will give the axis of the object in the reflection. Four corollaries are deducted from the examples illustrating reflections:—1. Reflections on horizontal surfaces will have the same vanishing points as the objects reflected; 2. The angle of incidence is always equal to the angle of reflection; 3. Reflections upon plane surfaces always lie in planes at right angles to such surfaces, and contain the object throwing the reflection; and, lastly, reflections upon plane surfaces will always appear to be at every point equi-distant with the objects casting the reflections to the reflecting surfaces.

The author has treated an intricate subject without entanglement, and the progressive manner in which he has arranged his lessons helps to facilitate an exact comprehension of them. Shadows are the inseparable adjuncts of realities; and we endorse his suggestion that sciography, as a means of expression of form, should be comprised in the programme of the studies of art-students.

## THE NEW UNIVERSITY FOR GLASGOW.

The University of Glasgow is the second oldest university in Scotland. It was founded by Bishop Turnbull, in 1450-1, in virtue of a Bull obtained from Pope Nicholas V. and a charter granted by James II. For 100 years, however, it had no endowment. Queen Mary, in 1560, gave it a moiety of the confiscated church-property in the city; and subsequent monarchs, as well as the corporation, have increased the endowment. St. Andrews University was in existence forty years previously to that of Glasgow; but all the other Scottish seats of learning came afterwards: King's College, Aberdeen, in 1494; Marischal College, in the same city, in 1593; and the now famous Edinburgh University, in 1617. It was not until after the Reformation that Glasgow became a place of any importance, and its progress was mainly in connexion with its church and university. The latter early acquired a reputation nearly equal to that of St. Andrews. Of the original building no traces now remain. The present edifice was erected between the years 1632-62; partly by public subscription, but chiefly through the munificent benefactions of Zachary Boyd. Of this celebrated and long-winded divine the following story is told. In 1651, Protector Cromwell took up his abode here, and went one Sunday to hear service in the cathedral. Mr. Boyd officiated, and inveighed so uncompromisingly against Oliver, that Mr. Secretary Thurlow proposed to have the defiant and fearless minister shot. Cromwell's only answer was, "He's a fool, and you're another. I'll pay him out in his own fashion." So he asked Mr. Boyd to dinner, and concluded the entertainment with a prayer that lasted three hours. Glasgow University is the gloomiest of buildings, situated in the most squalid and unsavoury of streets to be met with from Land's End to John O'Groat's. At one time the favourite place of residence of Scottish nobility, — High-street, — with the once equally aristocratic Salt-market (where lived Bailie Nichol Jarvie), the Gallowgate, Bridgegate, and other contiguous thoroughfares, are now inhabited by a population whose counterpart is to be found in Drury-lane or St. Giles's. The buildings consist of two quadrangles, connected by a not unhandsome clock-tower; and to the north of these is a third, in which are the houses of the different professors. Over the entrance in High-street is a balcony, and the arms of the founder in bassorelievo gilt. The most noticeable feature of the outer court is a massive stone staircase leading to the hall, which is panelled with oak. Over the archway of the inner court is a carved effigy of Zachary Boyd aforesaid.

The general style of the college is a mixture of the Elizabethan with the peculiar architecture which Scotland borrowed from France in the seventeenth century. It has the balconies, the tall rectangular chimney-stacks, corner to corner, and the variously-decorated window tops of the former; while the narrow rocket-topped towers of the latter, polygonal or circular, are conspicuous in the quadrangles. Beyond the buildings comprising the class-rooms, stands the Hunterian Museum, a structure in the Grecian style, and, of course, not at all in keeping with the rest of the college. This museum was founded by the celebrated Dr. William Hunter, of London. It contains a splendid collection of anatomical curiosities, and a good one of coins, books, and paintings—the last including specimens of Rubens, Rembrandt, and Salvator Rosa. Not the least interesting of the objects of the museum is the original steam-engine which James Watt constructed, and by his experiments on which he made his great discoveries. This building was erected after a design by Stark, in the beginning of the present century, an annexe having been added in 1838. The college possesses a splendid library of 50,000 volumes, and as a seat of learning it has long maintained a high position. The college green or garden, a large open space behind the museum, was the scene of the conflict in "Rob Roy" between Frank and Rashleigh Osbaldiston. Few cities in the Old World, it may safely be said, have made such rapid strides in physical development and commercial prosperity as Glasgow. In 1556, when the Scottish burghs were taxed by Queen Mary, Glasgow had a population of 4,500, and was only the eleventh city in the kingdom in wealth and population. In 1708 it was estimated at 12,776; in another century it had reached 83,769, and it has rapidly increased ever since. Thus, in 1821, the number of its inhabitants was 147,043; in 1841, 280,682; in 1851, 329,097; in 1861, 394,897; and it is now estimated that the population is half a million. The extension has been mainly westward and southward; and it has long been felt that the college was far removed from the virtual centre of St. Mungo, that its contracted limits were wholly inadequate to modern requirements, and altogether that the grim old pile, so ill-favouredly situated, was unworthy of the commercial capital of Scotland. For more than twenty years has local agitation been going on, with a view to the erection of a new and more suitable *Alma Mater* for the city. So long ago as 1846, a Bill for the disposal of the present site and buildings to the Monklands Junction Railway Company, and the removal of the college, received the assent of both Houses of Parliament. Nothing came of the project, however, the railway company having failed to carry out their agreement; and, in consequence of which failure, they had to pay, we believe, some 10,000*l.* as "smart money." At length, in 1864, a sale of the college and grounds was effected with another railway company, the City of Glasgow Union, the price being 100,000*l.* With promised aid from Government, the University authorities found that they had at their disposal the sum of about 139,000*l.*, and they at once set to work to carry out the scheme of removal. The lands of Gilmorehill, an eminence separated from the west-end park by the river Kelvin, presented an eligible site, and accordingly these were purchased for 65,000*l.*, and adjoining ground to the westward, and also on the south bank of the Kelvin, for a further sum of 33,000*l.* The first stone of the new buildings was laid in April, 1867. Exclusive of the professors' houses, they will occupy nearly four acres on the summit of the hill. The style of the new university is that of the early part of the fourteenth century, as applied to collegiate structures. The buildings, when completed, will form an oblong rectangular pile, 600 ft. long by 300 ft. broad, divided in the middle by a building which separates two courts or quadrangles, each 180 ft. square, or nearly four times the area of the two original quadrangles of the present university. The edifice will have an imposing effect viewed from the higher portion of the west-end park. The main or south front consists of a centre and two wings, terminating in flanks, which latter project a little, and are elevated a story higher than the rest. A tower rises from the centre to a height of nearly 300 ft. It is 36 ft. square at the bottom, the walls in the lower part being 7 ft. thick. This is reduced to 4½ ft. at the bottom of the spire, which commences at a height of 178 ft. from the ground, and springs up 114 ft. higher. The tower itself is divided into six stories, lighted by arched windows.

Near the foot of the spire there will be a clock, the minute-hand of which will be 7 ft. long, and each of the numerals on the dial 20 in. long. The chief entrance pierces the centre of the tower, leading into the middle of the buildings. The various class-rooms need not be particularly described. We may mention, however, that the lower hall is 129 ft. long by 60 ft. wide, and 22 ft. high. The roof is supported by twelve fluted columns of cast-iron, united at top by ornamented iron girders. Above this is another hall, of similar dimensions, but open above to the arched roof of the building, 52 ft. from the floor. The common hall will occupy the centre building, which divides the two quadrangles, but only in its upper part. The ground-floor is to be fitted throughout its whole extent with arcades, affording communication between the two quadrangles, and also, along with the cloisters, shelter for the students. The grand stair will lead to the hall, the museum, and the library; and in the upper floor these three apartments are so arranged that on fitting occasions they can be thrown into one magnificent suite, capable of receiving several thousand persons. There will be no fewer than ten boilers distributed throughout the University in connexion with heating apparatus, pipes, and tunnels for heating and ventilating, permeating the entire buildings.

They are so far advanced that the workmen have commenced to roof in the east front, and it is expected that the south or main front will be ready for roofing in a month. There are no fewer than 750 men employed daily at the works, and it will be at least a year and a half yet before the university be completed. The stone is chiefly that of Giffnock quarries, in the neighbourhood, and of Dunmare, near Bannockburn; the flagstones for steps being Arbroath pavement. The woodwork is all of Dantzic red timber, and is stained and varnished, but not painted. The architect is Mr. G. Gilbert Scott. The contractor for the stone and wood work is Mr. Thompson, of Peterborough; Messrs. M'Elroy & Sons, of Glasgow, have supplied the ironwork. Messrs. Wallace & Connell are the plumbers, and Mr. Morrison the slater. Mr. Bradford is clerk of the works. The entire cost of the new university is estimated at about 200,000*l.* Such is a brief outline of the important work, the foundation-stone of which was yesterday (Thursday) laid with "all the honours" by his Royal Highness the Prince of Wales." The occasion was observed as a general holiday in Glasgow.

Fortunate Escape of Eton College Chapel.—On a recent occasion, when, for the first time under new regulations, divine service was to have commenced at 9·25 at Eton College Chapel, on the entrance of the choir and students it was discovered that the chapel was filled with gas, which had been escaping since the close of the evening service, through some neglect in turning it off. Prompt means were taken to expel the gas, but the morning service was dispensed with. Had the service been arranged to take place as on the previous evening there is every probability that the edifice would have suffered much injury.

## THE MIDLAND RAILWAY STATION, ST. PANCRAS-ROAD, LONDON.

The Midland Station, opened last week, as we then briefly mentioned, is unquestionably, as regards the length, width, and height of the roof, the greatest in the world. The roof is 700 ft. long; the rafters rise from the platform 100 ft., and the roof is 240 ft. in span. In London the only roofs to be compared with that of the Midland Station are those of Charing-cross and Cannon-street Stations, which are each narrower than the one in question. A peculiarity of the Midland Station roof is, that while it is the widest span of any roof in existence, the vast space under the ribs is unbroken by ties or braces, perpendicular, horizontal, or diagonal, common to other roofs. Cannon-street Station roof, which is 60 ft. less in span than that of the Pancras Station, is a segment. The Midland Station roof is Subdued Gothic, with segments meeting at its crown. There are twenty-five principal ribs in the roof, each of which weighs about 50 tons. Between the principals are three intermediates of rolled iron, which are borne upon latticed purlieus. The station walls rise behind the spring of the principals, and the space at the top is filled with a sprandrel of open ironwork. The station roof covers an immense area of two floors, the basement being a cellarage for storing pale ale and other goods. The floor of the station is supported upon plate girders, which are borne upon 690 strong cast-iron pillars. Under this basement the Midland connexion is carried to the Metropolitan system. Reverting to the station, it should be mentioned, that all the upper structure is borne upon lateral and cross girders, covered with Buckle's patent plates. The platforms and carriage-road are, of course, erected upon this. The platforms have dwarf walls, with sleepers on the top, and are covered with close-jointed red deal planks, with hoop-iron tongues. The edges of the platform are of dressed stone. The carriageway is constructed of concrete in two arches, the centres shifted as the lengths are finished. The decorations in the station include a fine frieze about 2 ft. deep in Minton's enamelled tiles, and a dado round the base and foot of the principals. Space is provided for thirteen lines of rails, with platform accommodation available for nine lines. For the present the booking office, temporarily provided, is at the parcels office on the Skinner-street side, which has a good carriageway and a planked footpath with side railing from Euston-road.

One cannot tell what the effect of this great pile will be from its present appearance; the principal front being only just above ground, and the whole of the end and side fronts concealed by hoardings. The hotel does not as yet show to the front. It will have its chief façade to Euston-road, but will have also side fronts to Skinner-street and inwards to the station approach.

## THE TEMPORARY EMPLOYMENT OF OPERATIVES.

The essay on "The best and most feasible plan for the temporary employment of operatives and workmen in casual distress," by Mr. R. Arthur Arnold, to which Mr. W. R. Lloyd's prize of 25*l.* was awarded, was read at the Birmingham Congress. In a discussion of the various plans which have hitherto been or which might be adopted in seasons of distress, Mr. Arnold narrows the subject so as to make it plain,—1st, that in seasons of temporary distress it is unadvisable to promote emigration; 2nd, that the production of saleable commodities cannot be undertaken; 3rd, that in any employment of persons so accidentally reduced to indigence it is absolutely necessary to provide such labour as that at which they can earn wages sufficient for their maintenance; 4th, that no more than the proper value of their labour should be given in payment for the execution of such work; and, 5th, that the labour of indigent persons during periods of temporary distress, employed by the guardians of the poor or any other local and corporate authority, must be confined to works which will come under the denomination of "public utility" or "sanitary improvement." Mr. Arnold's proposal is that a Public Works Act should be passed, applicable to the United Kingdom, limiting to 2,000,000*l.* the annual sum which the Treasury should be empowered to pay to the Public Works Loan Commissioners for the purposes of the Act, the special consent of Parliament being obtained if any further sum was required in any one year. A minister of public works should be responsible for the reorganised business of the existing Public Works Loan Commission; but so long as that remains without a chief directly subject to Parliamentary control, the advances for the purposes of the Act should be made by the Public Works Loan Commissioners, upon orders bearing the seal of the Poor Law Board and the signature of the president of that Board for the time being. Loans should be made to any local Board acting under the Local Government Act, 1858; to any local authorities invested with powers of town government and rating under any local Act, by whatever name such local authority may be called; to any commissioners or body of persons, or any other authority having power to levy rates for general or special purposes; and to any guardians of the poor who have authority to borrow. No previous limitation of borrowing powers by any local Act should affect the claim of any local authority to borrow, under the Public Works Act, a sum equal to one year's rateable value of the property assessable within the district, or parish, or place in respect to which the loan is applied for. Any local authority, having borrowed to this full amount, might again mortgage their rates and obtain a further loan, an equal amount of the original loan being already repaid. The repayment of the loans under the provisions of the Public Works (Manufacturing Districts) Act, 1863, was by thirty equal instalments of the principal, the annual diminishing interest being added. A better plan would be to calculate principal and interest together, in which case the annual payment for thirty years of about 5 per cent. upon the total amount of the loan would pay off both principal and interest, with the advantage to the local authorities of paying an equal sum every year. The security for the loans would be upon mortgage of the rates, and any property of which the local authority was possessed in the locality in respect of which the loan was applied for. It would be requisite that the works proposed to be undertaken should be of public utility or sanitary improvement; and the expediency of granting loans would be determined by the department charged with the administration of the Act, the minister at the head of such department being responsible for the loans, the grant of which would in every case bear his signature as authority for the advance of money. The loans must be exclusively devoted to the actual works in respect of which such sanction is given. The money would be advanced in such instalments as the Department charged with the administration of the Act thought proper to sanction, and the payment of any instalment might be postponed or withheld on notice being given by the Department to the local authority that the works were not being proceeded with in conformity with the plan proposed. But the Department should have power to sanction alteration of plans on the advice of their inspectors, at the same time having no responsibility in respect to the design and execution of the works, which, together with their superintendence, would be entirely committed to the local authorities and their officers. Having given some further details, Mr. Arnold observed that there is no city, or town, or district in the United Kingdom, in which there is no need for the execution of works of public utility and sanitary improvement. Many are wholly without sewers, or only supplied with old drains, which are nothing better than poisonous cesspools; many have no water supply but from polluted wells; many draw their contaminated supply from brooks full of sewage and other impurities; in many, the old streets are badly paved, and the new or bye streets are impassable in winter, their surfaces covered with putrid filth thrown out from the houses; scarcely a river bed is properly and periodically cleansed of the accumulations brought by storms, which, obstructed by the bridges and buildings of towns, are usually deposited in their neighbourhood. Near every town there are undrained lands injuriously affecting the health of the population, the fertility of which would be greatly increased by drainage. Upon the public highways, there are in every direction hills which might be levelled, and valleys filled up, with great benefit to the public convenience and reduction of the cost of cartage. The permanent works of highway improvement executed in several rural parishes, under the provisions of the Public Works (Manufacturing Districts) Act, 1863, effected a saving of 50 per cent. of the highway rates. The works executed under such an Act are all of so beneficial a character, that their commencement before the occurrence of distress, or their completion after it has passed away, is thoroughly advantageous and satisfactory.

## THE FOUNDATION OF THE NATIONAL GALLERY, AND SIR GEORGE BEAUMONT.

The following memoranda, now first printed, will be read with pleasure by all interested in the progress of art. They were written by George Agar Ellis, afterwards Lord Dover, touching Sir George Beaumont and our National Gallery. Lord Dover was a man of great taste, and it was mainly through his exertions and influence that the Angerstein collection was bought by Parliament:—

One of the objects Sir George Beaumont had the most at heart was the establishment of a national gallery for pictures. He was constantly, during the years 1821, 1822, and 1823, talking to me upon the subject, and urging the various reasons which rendered such an institution desirable in this country, in all of which I concurred. He frequently begged me to speak to Lord Liverpool, then Prime Minister, about it, and always assured me that he would give his own pictures to the nation as soon as he saw a place allotted for their reception. I, in consequence, took several opportunities of mentioning the subject of a national collection of pictures to Lord Liverpool, who always received the suggestion favourably, but generally ended by rather throwing cold water upon the project, on the score of expense. I also frequently urged the same points to Lord Aberdeen and Lord Farnborough, and Sir George did the same; but still nothing was done. At length Mr. Angerstein died, and it was understood that his pictures were on sale. This was in the year 1823, and great fears were entertained that either the King of Bavaria or the Emperor of Russia would buy them, and that thus they would be lost to this country. Upon this Sir George again spoke to me, and we agreed together that now was the moment to press for the gallery. I again urged Lord Liverpool, but nothing was done. At length, towards the end of the session of 1823, I determined, with the concurrence and advice of Sir George, to take some opportunity, as all other means had failed of bringing ministers to a favourable decision, to mention the subject of the National Gallery, and of the purchase of Mr. Angerstein's collection, in the House of Commons, as I thought that if the temper of the House declared itself in favour of the acquisition, ministers could not for very shame avoid making it. I do not mean to say that they were not favourable themselves to the plan; but they were so timid and frightened at Hume and the economists, that they could not bring themselves to a decision. Accordingly, on the 1st of July, 1823, I took occasion of a vote for money for the new library at the British Museum, to state how anxious I was to see a national gallery of pictures established. I then alluded to Sir George Beaumont's promise of giving his collection to the public, and eulogised his conduct, and afterwards gave some account of the Angerstein collection, and of the danger there was of its being taken out of the country; and finally gave notice that if the ministers did not in the meanwhile purchase it, I would myself make a motion to that effect at the commencement of the next session of Parliament. Mr. Stuart Wortley (now Lord Wharncliffe), Mr. Alexander Baring, Mr. Hudson Gurney, Mr. William Smith, and, I think, one or two others, spoke in favour of my proposition. The feeling of the House was so evidently with me that the point was gained. During the recess the Government bought Mr. Angerstein's pictures, and the National Gallery was established. I have gone into this detail in order to explain Sir George's letters, which were written subsequently to the discussion in the House of Commons, and which show his great anxiety upon the subject. I am, indeed, quite certain that without his persuasions and encouragement, and the permission he gave me to announce formally the donation of his collection to the nation, I should never have had the heart to do what I did, so discouraged was I by the delays and vacillation of the Government. I have been anxious that you should know the part Sir George had in this transaction respecting the National Gallery,—first, because it is

highly honourable to him; and, secondly, because it is something of an event in a life of such amiable and retiring tranquillity as his was. His allusions to the prints of Garrick relate to two engravings of Garrick, which were executed by Reynolds under his inspection and correction, and which he was anxious to have engraved, because he considered them the two best likenesses of that great actor extant. They are after Dance and Zoffani, in the characters of Richard III. and Abel Drugger.

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George Howland Beaumont was born November 6th, 1753, and had an only brother Charles, who died an infant. His family, which is very ancient, derives its name from Bohemond, Count of Antioch, and is lineally descended from the royal families of France and England. By the death of his father, when Sir George was still a child, he was left to the care of his mother whose maiden name was Rachel Howland, a woman of extraordinary powers of mind, during the whole of her long life. She died in 1814, at ninety-six. She was ever regarded by her son with the greatest affection. He married, in 1784, Margaret, daughter of — Willes, esq., of Astrop, Northamptonshire, and granddaughter of the Lord Chief Justice Willes. It was during private theatricals at Mr. Bawles's, North Aston, that he first saw her, and was much struck by her great beauty.

As an actor he possessed great talents; and it has been even said in one or two characters nearly equalled Garrick. With this celebrated actor and many others he was intimately acquainted; and King bequeathed to him the Shakspeare cup he had himself received from Garrick.

With most of the artists and wits, and, indeed, distinguished men of all kinds, he was also on friendly terms. Sir Joshua Reynolds, Sir Uvedale Price West, Payne Knight, Colman, &c., may be mentioned.

Sir George's taste for drawing appears to have been first developed in the tour he made to Rome after his marriage. His first drawing-book (at Eton) is hardly so far advanced as usual with boys of that age. At Paris, during some of the early scenes of the Revolution, he had a narrow escape. He was walking with the late Lord Beverley, when they accidentally witnessed the execution of an unfortunate man by the populace *à la lanterne*; their look of horror attracted the attention of the furious people, and they were only saved by a *poissarde*, who, having taken some fancy to them, dexterously fixed the tricolour cockade in their hats and favoured their escape.

Early in this century Sir George determined on rebuilding the house on his estate in Leicestershire, Cole Orton, and employed the talents of Mr. Dance.

The amusement of laying out and beautifying the grounds, and improving the condition of the villagers, afforded him delightful occupation for the remainder of his life. In the country he always devoted the morning to painting, but so diffident was he of his own success that he destroyed many of his pictures, and would have destroyed many more had not Lady Beaumont removed them from his sight. He has left many unfinished from the impossibility of pleasing himself. To others, and to their productions, he was invariably kind and encouraging. Sir George made another excursion to Switzerland in 1819, and again to Rome in 1822. It was then by the assistance of Canova he succeeded in securing the *alto relievo* of Michelangelo, which he left conditionally to the Royal Academy. His cousin, the present baronet, has since presented it unreservedly to that body.

Many of the earliest pictures of our best artists were purchased by Sir George,—Wilkie's "Blind Fiddler," Haydon's "Macbeth," &c. The paintings he presented two years before his death to the National Gallery were the collection of his life. Of the Narcissus he was so fond that it always travelled with him; indeed his admiration of Claude may almost be termed a passion. In his collection of drawings there are many of Gilpin, Alexander Hearne, Girtin, Dance, Cozens, &c. The beautiful group of Psyche borne by Zephyrs was executed for him by Gibson after his last visit to Rome; but he did not live to see it arrive in England, dying after a few days' illness, occasioned by cold, February 7, 1827, aged seventy-four. His widow survived him two years, dying in July, 1829, at the same age. At his particular desire a simple tablet was placed in Cole Orton church, where he was buried, with this inscription,—

"Enter not into judgment with thy servant, O Lord."

Many of his paintings are still in the possession of his family; several were presented by his widow to various public galleries; among others, to the Academy at Rome.

His disposition was amiable and kind: his religious feelings were strong; his conversation was peculiarly interesting, possessing much quiet humour, and enlivened by a great fund of anecdote.

He appears to have been indefatigable in the pursuit of the art which was his engrossing passion, and has left an immense variety of sketches. It was with Sir George that the first idea of a public exhibition of Sir Joshua Reynolds's paintings originated, and to his exertions, which were most graciously encouraged by the late king, and kindly aided by Lord Melville, &c., that the public were indebted for the success of that idea.

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## LIGHT AND COLOUR.

My own hypothetical suggestions, both in the lecture and the several letters which have appeared in the columns of the *Builder* during the last twelve months, have been but mere addenda to their more important objects, and must await experimental proof. These more important objects have been to point out the constant confusion of the Newtonian and "undulatory" hypotheses and the neglect to take into account the physiological considerations necessary to a true comprehension and *a putting together* of the theory of light and colour by English writers, objections from which I do not consider Mr. Benson's letters and work are exempt. I know the difficulty of framing language strictly in accordance with pure theory; it is not easy to emancipate oneself from the common faulty habit of speech in these matters. I trust, therefore, that my observations will be received as actuated by a fair spirit of criticism, and a desire to attain to a more correct enunciation of the received theory, and not to detract from the object of Mr. Benson's labours, which are in part similar to my own. That Mr. Benson works from sheer devotion to and love of his subject may be gathered from the following passage at page 39 of his work:—"*It seems clear that, strictly speaking, there can be no discord in colours,*" for such a conviction with most men would have deterred further prosecution of the subject.

In treating of so complex a theory, or a theory having so many ramifications as that of light and colour, it is better to keep special phases of it distinct, otherwise discussion is apt to run backwards, forwards, and across in inextricable confusion.

### *Definitions.*

Light is a sensation, supposed by Newton to be caused by atoms projected from the sun* striking upon the retina; colours, sensations produced by the different velocities of those atoms. That every ray or beam producing the sensation of white light is compounded of, some of his expositors say, seven; others, an infinite number of rays of travelling atoms, of various velocities. Wave lengths are no part of this hypothesis. The undulatory or received theory supposes that light is a sensation produced by undulations on the retina; colours, by the different wave lengths and rapidity of those undulations.

Colours, therefore, according to either of these theories, has no objective existence, but is only a form of sensation. If it were objective and inherent in the atoms or the waves, the different velocities of the one and the wave lengths of the other theory would be superfluous assumptions. But Mr. Benson, in common with other authors on the same subject, is constantly giving objectivity to colour; for instance,—"The colours of all natural objects are merely the sensations produced by *those* of the incident rays,"—"the white light of the sun,"—"is the sum of the *colours of* all the component lights,"—"*Green* rays added to the *blue*." These are only a few out of many which could be enumerated.

Whilst, however, the Newtonian hypothesis has been abandoned in the main, its suppositious bundle of an infinite number of rays has been transplanted to the undulatory theory; and if it is cumbrous and improbable in its original domain, it is much more so, it appears to me, in its new soil. What is the diameter of that bundle? What its form of section? What the disposition of its fasciculi? These questions lead to very important considerations, having reference to the integrity and truth of the general supposition, and are questions which I have never seen touched upon, much less solved. The Newtonian hypothesis in immediate reference to the prismatic rays is not the great discovery it has been proclaimed; it is a compound of fact and supposition which I, myself, feel convinced will be proved to be one of that intellectual giant's infelicitous conjectures. And as Mr. Benson is so wrapt in this "great discovery," I am not surprised to find him clinging to the ancient, instead of the more advanced physiological explanation of the *ocular spectra*, and this leads me at once to the subject of

### *Compensation.*

To compensate is to make even that which is irregular, to counterbalance. Now the inviolability of the fasciculi, "infinite in number," composing the solar beam, which Mr. Benson so tenaciously clings to, precludes the possibility of any external compensation. The compensation, then, which we talk of in respect to the harmony of colours, is a readjustment in the sentient constitution of the eye itself. And what is our great experience of the nature of the compensation which is constantly going on in our sentient being? It is this. That after it has been moved from its *mean* or general state in any special direction, it has a reactionary tendency in the opposite direction. Indeed, this is not a tendency peculiar to our own, but to all nature, in confirmation of which a volume of instances might be cited. "Insensibility" is that state of the human system in which reaction is rendered either difficult or impossible. I would therefore venture to suggest the following as the law of compensation in reference to colour, viz.: *That in proportion as the retina experiences a colour of one kind, is its tendency to a sensation of colour of an opposite kind*, or one which tends to balance and re-establish the equilibrium of the optic system.

The "insensibility" of the eye to one colour, according to Mr. Benson, and some former writers upon this subject, is clearly, according to their own showing, a keen sensibility to another. But taking my own statement of the law which I have here ventured to intrude, the old-fashioned explanation of the ocular spectra might possibly pass; but unfortunately for the old hypothesis, the compensating spectra appear on closing the eye. The familiar experiment of looking at a window and then closing the eyes, will point the way in which this important fact may be best tested. In this case the reaction is merely from light to dark, and from dark to light, the glazed spaces after a while appearing dark; the frame, the sashes, light. If, however, instead of white glass we substitute coloured glass, the spectra will be coloured and compensating on closing the eye. If the eye be sensitive, the fact of the ocular spectra being reactions of the retina may be confirmed by the usual means, and, after intently gazing at the wafers or spots, closing the eye. If further proofs be needed I can give them. These experiments are not only conclusive regarding my statement in my last letter, that ocular spectra are due to nervous reaction, but that light and colour are sensations which may exist independently of any direct external excitement whatever.

It is very curious to observe that the inviolability of the fasciculi of the solar beam or ray which Mr. Benson so much insists on, is dead against his other notion of yellow being a secondary sensation, for every colour would then be caused by a particular primary, *inviolable* wave. Marked difference, as a colour, yellow has; it is therefore primary according to Mr. Benson's foundation doctrine, and for the only two reasons it is possible to call a colour "primary." There are two terms to the equation of compensation, and these are mutually compensating. A compensating colour, therefore, is not necessarily a secondary.

Newton's great discovery, says Mr. Benson,—

"Was, that the sun sent out an *infinite* number of *different* kinds of light, all *differently* refrangible, and producing *different* sensations of colour; and that the property, whatever it might be, which gives to each kind its peculiar refrangibility, is *invariable* with the colour sensation which attends it. This is the very foundation of the science of colour."

* This definition might, of course, be framed to apply to all illuminating sources.

*Ergo*, an *infinite* number of *different* kinds of light would include a yellow ray, pure, simple, uncompounded. Every ray is a primary.

"The whole essence of the theory is involved in the fact, that every separate wave maintains its own time invariable, and its own proper effect at every point of the ether which it reaches, whether such point is at rest or disturbed by any other wave or waves at the same time."

With this passage compare the following:—

"So that all the colours which lie in the spectrum between the first and second, and second and third of these may be produced by *mixtures* of these," &c.

In the former paragraph Mr. Benson says the waves preserve themselves *invariable*: are the waves still invariable when they are *mixed*; or does he mean that the sensation is mixed? There is such a thing as *interference*: are the waves invariable at the same point then? There is, too, such a fact as rays diminishing in power in a certain ratio to distance: are the waves of each ray the same at the sun as at the earth? Is it consistent with *the simplest principles of dynamics* that waves should be propagated through matter unaltered? I think not: there is a decadence in the wave as it progresses in time and space from the originating force, just as the waves of a bell after it has been struck pass in the resonance (I am told) to the third and fifth. The matter of naming a colour primary or secondary is of little consequence, but to have a clear logical exposition of theory is of the utmost importance.

On my own notions respecting the science of light and colour, I have in the main forborne to dilate in this communication; for the further exposition of these, and the details of an important experiment, I must beg Mr. Benson, and the readers of the *Builder*, to wait, on account of full occupation. W. Cave Thomas.

## THE ARCHITECTURAL ALLIANCE.

At the last meeting of this association there were present, for the *London Architectural Association*, Messrs. T. Roger Smith, T. M. Rickman (secretary *pro tem.* of the Alliance), J. Douglass Mathews, and R. Phèné Spiers. From the *Glasgow Architectural Society*, Messrs. Alexander Thomson and John J. Stevenson. The *Liverpool Architectural Society*, Mr. G. E. Grayson. *Manchester Architectural Association*, Messrs. Peter B. Alley, jun., and Alfred Darbyshire. *Northern Architectural Association*, Mr. R. J. Johnson. *Nottingham Architectural Association*, Mr. T. C. Hine (treasurer), and Mr. Kennedy, from Glasgow (not a delegate). Mr. T. R. Smith presided.

A paper by Mr. Hine was considered, proposing that the quantities should form part of the basis of contract, as much as plans and specification, and that the architect should be responsible for them, whether prepared by himself or by his surveyor. After discussion, it was resolved,—

"That inasmuch as the bills of quantities are now generally tacitly received as the basis of builders' contracts in the settlement of their accounts, in the opinion of this meeting it would be more just, both to client and builder, as well as more satisfactory to architects, were the bills of quantities formally recognised as part of the contract."

A deputation from the General Builders' Association was introduced, consisting of Mr. Whiteley, of Leeds; Mr. W. B. Briggs, of Birmingham; Mr. E. Johnson, of Manchester; and Mr. A. Mault, of Birmingham, secretary.

Mr. Mault proposed that their society and the London builders should meet a committee of the Institute and of the Alliance, to draw up a model contract. He also complained that throughout the country building contracts vary in their terms, and he argued that they should be specific in terms to a greater extent; that sometimes drawings offer very indifferent data for contracts, while many contracts are on the theoretical footing, that one party being the proprietor, the other the builder, the architect is independent; whereas they hold that the architect is not independent, but the nominee of one party, and that oftentimes builders are thereby inconvenienced and their interests prejudiced from the fact that the architect thus appointed is sole judge.

They want an ample arbitration clause on all subjects in dispute, but not upon material and workmanship.

It was further urged, that there is a want of mutuality shown in the provision for taking the work out of the builder's hands for want of speed, while there is no counter provision as to want of funds.

There are also usually clauses relating to the bankruptcy of the builder, but not relating to the bankruptcy of the proprietor; nor is there usually any reciprocity in the arrangement as to sureties.

The builders admit that a penalty for *time* should be part of contract, but they urge that the position of the architect should be more defined as to orders for extras.

In case of sealed contracts, they also urge that powers should be taken for variations, without the use of a sealed instrument.

And also that, as quantities are a definite part of the contract, either builders should join in appointing the surveyor, or where the quantities are supplied they should form part of the contract, and that as to sums kept in hand there should be some recognised limit; also some common understanding as to the ordinary terms and periods of payment.

It was resolved,—

"That the Alliance appoint their office-bearers as a committee to hear the representations of the General Builders' Association, and, in conjunction with any other bodies who may be interested, to endeavour to come to some agreement on the subjects submitted for consideration, and to report to the Alliance at its next meeting, or to the constituent societies at an earlier period."

Mr. Plevin's form of contract was then considered.

Mr. Spiers reported a resolution from the Architectural Association *against* the scheme.

It was ultimately resolved,—

"That, as the whole of the questions covered by Mr. Plevin's form of contract are included in the subjects that will have to be discussed with the General Builders' Association, it will be premature to enter upon them at the present meeting."

As to architectural education, it was resolved,—

"That the secretary be requested to obtain information from the allied societies as to the facilities for architectural education now existing, and to report upon the subject to the next meeting."

## MANCHESTER ARCHITECTURAL ASSOCIATION.

The annual meeting of the Students' Class was held on Monday evening, the 28th ult., at the Society's Rooms, Lord's Chambers. There was a good attendance. The secretary and treasurer's reports were passed; the latter showing a balance in favour of the society. Mr. Alley, jun., treasurer, and Mr. W. H. M. Ward, secretary, were re-elected, and Mr. Redford was made the president in lieu of Mr. Battye, who retired. The society seeks to educate students in architecture in branches not ordinarily learnt in office routine. The construction class is held on Monday evening, under the supervision of Mr. Battye; the freehand drawing class on Friday evening, directed by Mr. Redford; and the water-colour class on Saturday afternoon, by Mr. Bagot.

## ARCHITECTURAL STUDENTS IN PARIS.

At the Palais de Beaux Arts in Paris the designs sent in competition by the architectural students for prizes were publicly exhibited on the 30th ult. The subjects were—1st, a church; 2nd, a hospital; 3rd, Hôtel de Prefecture. For the first subject there were sixty-eight competitors; for the second, twenty-eight; and for the third, eight; making together 104 competitors.

It would appear that the anathemas hurled by M. Viollet le Duc against all non-mediæval art have had but scant influence on our artistic friends across the Channel, for of the 104 designs three only are in the Pointed style.

The 416 drawings completely fill the great hall of the Palais. Among them there are many good drawings, but only one medal was awarded.

## CONSECRATION OF NEW CHURCHES AT WOBURN AND WOBURN SANDS, BEDS.

The new church erected at Woburn by the Duke of Bedford has been consecrated. The site is near the Woburn entrance to the ducal park. The edifice, which has been erected from the designs and under the superintendence of Mr. Clutton, of London, architect, at a cost of some 26,000*l*., exclusive of the value of the ground, is built in the Gothic style of the thirteenth century, the materials being Clepsham stone with dressings of Box Ground stone for the exterior, and for the interior Cowham stone. The extreme height of the structure is 61 ft., and from the ground level to the top of the parapets the height is 40 ft. Projecting through the parapets are a series of gargoyles discharging upon iron traps beneath. The nave, which is 96 ft. long by 64 ft. in width, is supported by seven duplicate columns, with plain shafts and carved capitals, and is lighted by nine windows, five in one, and four in the other aisle, together with three windows and an oriel at the west end. The vaulted roof is carried level throughout, at an average height of 50 ft. from the pavement, so that by this arrangement there is no reredos. Instead, there is a flight of steps leading to the chancel floor, the level of which is some 3 ft. 6 in. above that of the nave. At the eastern extremity of the chancel another flight, consisting of three steps, leads to the area in which the communion-table is placed, the level of this portion of the chancel being 5 ft. above that of the floor of the nave. The extreme length of the chancel is 52 ft., and the width 26 ft., the whole of the interior being vaulted with stone. The chancel has at each side three windows, and at the east two lancet windows, surmounted by a central oriel 13 ft. in diameter. In due course all the windows, according to our authority, the *Bedford Times*, will be of stained glass. Beneath the chancel there is a crypt, 72 ft. by 24 ft., vaulted with stone, and supported by two rows of columns. This is to be used as the future burial-place of the Dukes of Bedford. The tower, which is situated at the western end, is 28 ft. square, and, with the spire, reaches to the height of 185 ft. Probably the height to top of the copper cross which crowns the spire may be set down at 200 ft. It contains a new bell, weighing nearly 3 tons, cast (in C) by Messrs. Mears & Co., of London, and has a deep sonorous tone. The fittings are all of oak. At the western extremity of the north aisle, and fronting the font and main entrance, is the organ-gallery, supported on pillars, and ascended by a flight of spiral stone steps. The organ has been built by Mr. T. J. Robson, of London. In the west wall of the church, directly opposite the font, is inserted a slab of polished granite, on which is carved the following simple inscription,—"In the years 1865-66-67-68, William, 8th Duke of Bedford, built this church,"—under which, in small and unpretending characters, is a record of the architect's labours in the sentence—"Operâ et consilio Henrici Clutton, Archit." The clerk of the works was Mr. J. Young.

The new church at Woburn Sands has also been consecrated. The edifice has been erected at the cost of the late Duke of Bedford. It is erected on the crest of one of the lofty ridges which skir. the main roadway through Woburn Sands, and is called St. Michael's-on-the-Mount. The building is erected in the Gothic style of fifteenth century; the materials employed being Cosgrove stone, with dressings of Box Ground stone for the exterior, and Cowham stone for the interior. The nave is 64 ft. long by 38 ft. in width, and is covered with an open timber roof, and the chancel is 20 ft. by 18 ft. At the west end of the structure a turret rises to the height of about 80 ft. The fittings of the nave are of deal, while those in the chancel are of oak, carved. The edifice has been erected from the designs and under the superintendence of Mr. H. Clutton, London. The cost is roughly estimated at 5,000*l*. The organ, which has been presented to the church by Mr. Steven, of Aspley Guise, was a family heirloom, supposed to have been built 300 years ago, by a German named Snatchel, and the principle on which it is erected is so peculiar that, on the organ being lately remodelled prior to its being set up in the church, it was supposed to be the only one of its kind in this country. The church is capable of accommodating about 500.

## THE NEW INDUSTRIAL SCHOOLS AT KIRKDALE.

The additional Industrial School buildings at Kirkdale, in connexion with that department of the Liverpool Parochial Vestry, and which have been rendered necessary in consequence of the over-crowded state of the existing schools, have just been completed, and will shortly be opened. The new buildings, which are quite distinct from the old schools, have been erected from designs by Messrs. Picton & Son, of Liverpool, architects. They stand on high ground, in the immediate vicinity of the county prison. The style adopted is Gothic. The principal elevation, which faces the south, is 357 ft. in length, and 40 ft. in height to the battlements, and consists of three stories. In the centre is a tower, which rises 68 ft. above the battlements. Beneath this, and over the main central entrance, is a large, ornamental, oriel window, below which again there is a prominent three-light window. At each side of the main entrance there are two carved figures in stone, representing Charity and Mercy. At the east and west ends of the building respectively there are pavilion roofs, which rise to a considerable height. The east and west elevations of the building are uniform in design with the south front, the school-room, dining and play rooms, having mullion chancel windows. The rear of the building forms a large quadrangle, there being, in addition to the east and west wings, what may be termed a centre wing, containing school rooms, play rooms, and dormitories, uniform with the other portions of the

building. The main south entrance leads to a corridor, 7 ft. in width, which runs the entire length of the building, from which, in the front part, on the ground-floor, are approached the several day-rooms, teachers' rooms, offices, and other rooms in the master's department. From the opposite side of the corridor, in the centre, a play-room is entered, 73 ft. in length by 30 ft. in width, with an additional play-shed beyond it, 75 ft. by 30 ft. The principal school-room is in the east wing of the building, and is 83 ft. long by 30 ft. wide, and 36 ft. in height; whilst the dining-room, which is in the west wing, is 80 ft. long and 30 ft. wide, and uniform in height with the schoolroom. Two staircases, one at the east and the other at the west end, lead from the ground floor to the first floor, along which there is a corridor exactly uniform with that already described. The whole of the first floor is divided into dormitories of uniform size, for the use of the officials of the establishment as well as the inmates. The upper story is approached by a staircase similar in size to the one beneath it, and a uniform corridor leads to three large dormitories similar in size to the large school-room, dining-room, and play-room on the ground floor, in addition to which there are also a number of smaller dormitories. With the view of promoting ventilation there are iron gratings on each side of the entire length of the two upper corridors, by which a constant current of air is kept up from the ground floor, whilst for the entire ventilation and warming of the building throughout apparatus and machinery have been fitted up in the basement, under the immediate superintendence of Mr. Watson, of Halifax. Mr. J. Westmoreland, of Islington, is the sole contractor, and the building has been erected by him, assisted by tradesmen who have taken contracts from him in the several departments. The new premises are calculated to accommodate 700 children, which, with the capacity of the existing building, will contain shelter and education for an aggregate number of about 1,900.

## ACCIDENTS.

Two serious accidents have occurred at the new Midland Railway Station, King's-cross. A labourer, employed by the contractors, fell from a high roof and sustained such injuries that he had to be taken to the Royal Free Hospital. Another labourer also fell from a roof, and was taken to the same hospital, suffering from concussion of the brain.

An inquiry has been held at St. Bartholomew's Hospital, touching the death of a workman who was at work on the roof of the new Smithfield Market, when he fell, and was dashed to the ground. His skull was fractured by the fall. The jury returned a verdict of "Accidental death."

At the Lord Mayor's Court, before Mr. Serjeant Tindal Atkinson and a common jury, the case of "Vonder Heyde and wife *v.* Peters" has been tried. It was an action to recover compensation in damages sustained through the alleged negligence of defendant's servants. It appeared that on the 17th of August last a wagon belonging to the defendant, laden with scaffold-poles, turned into Red Cross-street, and the poles projecting behind swept over the pavement and struck plaintiff down. She was much shaken, and was laid up for some time. A City police-constable said the poles ground against the kerbstone for some distance, and then sprung up over the pavement, and struck down the plaintiff. He heard no warning given. It was admitted that the cart was the property of the defendant, but at the time of the accident it had been let to a railway company, and was then in charge of the railway company's servants. It was also mentioned that a proper warning had been given. Witnesses having been called for the defence, the jury found for the plaintiff, with 10*l.* damages. This case lasted over two hours, and the jury receive 2d. each for trying it.

While Sir John Trelawny was addressing a large meeting at Bude the overcrowded platform gave way, and caused a scene of great confusion. Two men who were underneath at the time were injured, one seriously.

Two houses at Low Town, Holly Hall, Dudley, fell recently, and carried with them a nailer's shop and outhouse. The block thus destroyed was situate at the end of a ruinous row of building in what is called Bugs Gutter, a part of the town thoroughly undermined by the neighbouring pits. The lower extremities of two women were buried beneath a terrible load of bricks, timber, &c., but their heads and chests were protected by a joist which had fallen, but lay in a slanting direction across them. The poor creatures were released, after half an hour's hard labour. Two bricklayers employed in repairing a portion of the wretched premises were injured, though not in a very serious manner, one being thrown from his ladder, and the other cut and bruised by the falling material. The two houses are a complete wreck.

## RAILWAY MATTERS.

The trial of Mr. Charles Kendall's atmospheric break has been in progress on the London, Chatham, and Dover Railway for three years. A novelty in working the apparatus for the instruction and amusement of a party on a trip from London to Margate and back was the placing full command of the break in the hands of the engine-driver. The driver, it is urged, is captain of the train, and should be entrusted with power equal to his responsibility. That he as well as the guard should have the means of checking or bringing to a stop the carriages in the rear of the engine is a condition fulfilled by the atmospheric railway break, which simultaneously blocks the wheels of the whole train, and which may be worked from either end. The first stop was between Sevenoaks and Farningham, on an incline of 1 in 100, the train being checked in a speed of 35 miles, and within a space of 323 yards. His second pull-up was on a level at Sole-street, when the train was going 40 miles an hour, and was stopped in a space of 220 yards. The third stop was, from want of time, not measured, but was judged between 160 and 200 yards, at the utmost, the speed of the train being at the time 55 miles an hour. Three more stops were made before reaching Margate, with increased success. Mr. Kendall's break includes a plan of communication between driver and guard, accessible only to passengers.

An experiment has been tried on the Manchester, South Junction, and Altrincham line, with Kearsley & Holt's railway carriage alarm signal. One of these signals was attached to the top of a first-class carriage. In each of the three compartments there was a light chain, stretching from side to side, attached to the signal. If a passenger wishes to give an alarm whilst the train is in motion, he has only to jump up and give any portion of the chain a pull. The pulling of the chain raises a semaphore on the top of the carriage outside, and uncovers a revolving wind-vane, which is then set in motion by the wind, and rings a large bell, which can be heard distinctly through the whole of the carriages in the train, as well as in deep cuttings and tunnels. The noise of the bell would instantly attract the attention of the guard and driver, the train would be brought to a standstill, and the semaphore which had been raised, and of which the driver could have a good view from the engine, would indicate the carriage from which the alarm had been given, and the reason of the alarm could at once be ascertained. At night the signal carries a white light, which is converted into the red or danger signal when the alarm is given. Tampering with the signal by a passenger when he has once given the alarm is impossible. When he once pulls the chain a small round ball descends from the roof of his compartment, which he cannot put back again, and this shows where the chain has been pulled. Such is the account of this signal, which we condense from a contemporary. Now suppose that one or two of the knocker-wrenching gentry happen to be amongst the occupants of a first-class carriage. The train comes into a tunnel during the day time, when there is no lamp lighted in the carriage. One of them pulls the chain quietly and the train is stopped. We may leave the result to the imagination of our readers. Or even let a nervous old woman, of either sex, conscientiously believe that there is an absolute necessity for stopping the train for some imaginary reason or other, would the punishment of such a person prevent the recurrence of similar *contretemps* in other cases? Communication between passengers and guards is most essential to the public safety, but no such "communication" can be effected in a satisfactory manner so long as the guard is fixed up in a box, or until he be enabled to communicate personally, and see with his own eyes and hear with his own ears, what it is that requires the stopping of the train *before* it is stopped. The unnecessary and irregular stopping of trains would occasion not only delay but danger itself to the public. All short of this, we fear, is little better than ingenuity thrown away in order to save expense to railway companies.

## BAY-WINDOW, RATHHAUS, RATISBON.

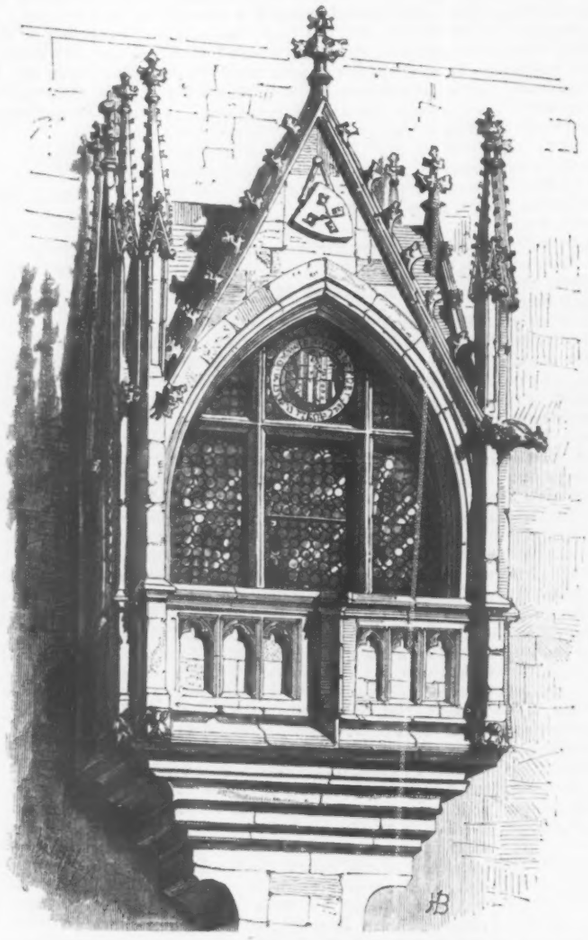
The Rathhaus at Ratisbon is a charming specimen of German Gothic of the end of the fourteenth century. The principal portion of the building consists of a large oblong structure, containing the council-chamber, entrance-hall, chief staircase, and below these a set of most dismal dungeons and a torture-chamber, with all its fearful machinery *in situ*. The most beautiful portions of the building are the porch, which has a very rich doorway; and the bay-window, of which we give a sketch. This bay-window projects from the centre of the east side of the council-chamber, to which it opens by a low arch. There can be little doubt that it originally formed a kind of chapel or oratory, and was separated from the council-chamber by a portable screen. On one side of the window, carved upon a panel, is the date 1400. It is doubtful whether the tracery is of the same date as the other portions of the bay window. It looks very like an alteration of the sixteenth century. It is, however, well moulded and of stone. Attached to the Rathhaus is a lofty square tower, with a clock and bells; and in one of the smaller chambers are some fine old tapestry, and a fifteenth-century "corona" for holding candles.

## EASTCHEAP.

When London was at once a fortress and a royal palace, Eastcheap, being the direct thoroughfare into the City, was a fashionable lounge, from the beginning of the thirteenth century down to the time of Henry VII., partaking of the character of the modern Pall-mall and St. James's-street, mixed with a strong flavour of what the Haymaket was a few years back before the night-houses were interfered with. It was here during nearly two centuries that the most fashionable traders displayed their goods; here the cooks and tavern-keepers, the predecessors of the modern club, had their ordinaries, and the roysterers of the time held their carousals. Lydgate, the poet monk of Bury, and the contemporary and friend of Chaucer, in the peregrinations of his ideal character of Lackpenny, thus describes it in the reign of Edward III.:—

> "Then I hyed me into Eastchesp:
> One cryes rybbe of befe and many a pye,
> Pewter potles they clattered on a heepe,
> There was harpe, pype, and minstrelsye;
> Yea by Cock, nay by Cock, some begenne crye,
> Some songe of Jenkin and Julyan for their mede,
> But for lack of money I might not spede."

The genius of Shakspeare has peopled this district with the creatures of his imagination, who are made by his magic to occupy as much of our memories as do the real characters of history, and the ideal characters dispute the places with the men and women who have actually lived and carried on the world's history. We know Falstaff and Poins, Bardolph, mine ancient Pistol, and Dame Quickly, as well as we do our familiar acquaintances; and it is doubtful whether the real characters of the contemporary history are as vividly brought into our minds when we think of the reigns of Henry IV. and Henry V. as the personages which poetry has given character and form to. What Shakspeare had begun, Goldsmith, in his essays, and Washington Irving in his sketches, have continued, and have made the whole of Eastcheap classic ground. Stow, speaking of Eastcheap, mentioned an occurrence which took place here in the year 1410, between the two younger sons of Henry IV., Thomas and John, who had been carousing here "during the small hours of the night," until the morning, and with some of their friends had got into a quarrel, were taken by the City watch before the civic magistrates, and afterwards before Judge Gascoigne, which occurrence most probably, with its traditional festive reputation, has induced Shakspeare to lay his scenes of the revelries of the Mad Prince and his debauched companions at this spot. After the time of the first Tudor (who was the



BAY-WINDOW IN THE RATHHAUS, RATISBON, GERMANY.

last king that made the Tower a place of residence), festivity and fashion went farther west, and the shops of the Royal Exchange, with those of Cheapside and St. Paul's-churchyard, became for a time the loadstone of attraction for the court gallants, the rich citizens, and their gayer wives. But what the world turns from, fashion turns to; so in time its votaries were drawn again still farther westward, and commerce filled up the void. Still in the time of Sir William Davenant it continued to be the abode of well-to-do citizens who, in his "London Vacation," narrates in verse the departure of a citizen and family from Eastcheap to Islington, to enjoy the country sports and pleasures. Eastcheap has, however, now entirely lost its ancient residental and minor business character, and as Thompson says,—

> "There commerce brought into the public walk,
> The busy merchant the big warehouse built;
> Raised the strong crane, choked up the crowded street
> With foreign plenty."

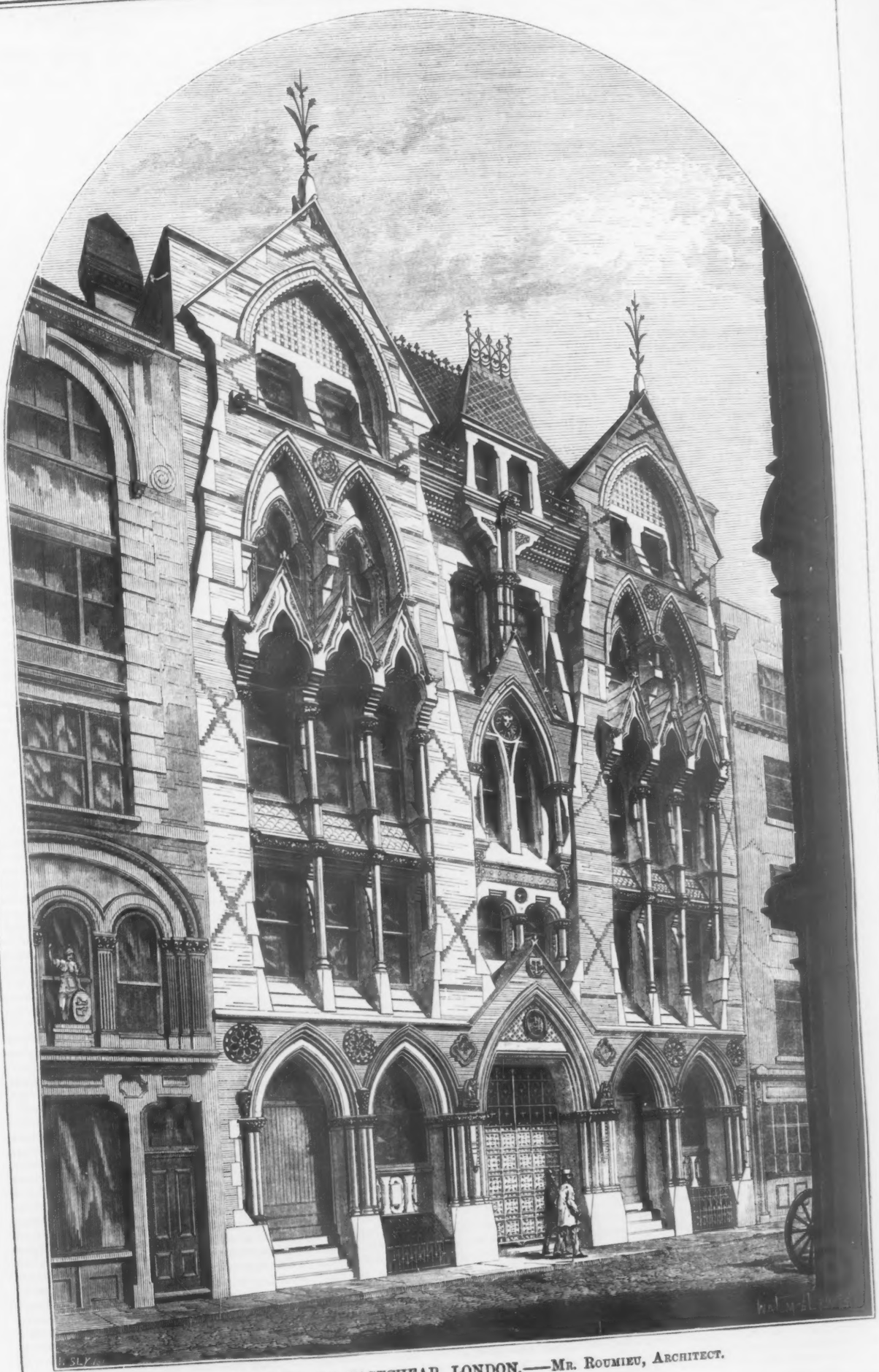
In fact, it has become one of the great centres of business for the colonial and wine trade. The ghosts of Falstaff and Pistol may still be supposed to haunt the scenes of their former revels. They may, as they were wont of old when out of purse, to only sniff the fumes of the sack as it rises from the cellars which spread everywhere underground, like the roots of the trees in a forest, filling all the spaces below, while the spice and ginger, which "is as hot in the mouth" as heretofore, rest in the warehouses above. But business, instead of pleasure, is everywhere; and the ancient Dogberry's office is now superseded by the City policeman, regulating the traffic during day, instead of quelling the disputes and taking roysterers into custody "during the small hours of night," which is now, by contrast, the only time that the neighbourhood is perfectly quiet and deserted.

The building which forms our illustration has been erected either upon the precise site or close upon that of the old Boar's Head Tavern, before alluded to as mad-cap Henry's place of revel. It has been built by Messrs. Hill, Evans, & Co., British wine and vinegar manufacturers, of Worcester, for their London depôt, their present offices and warehouses in Martin-lane, Cannon-street, being required for the extension of the Metropolitan District Railway, which, together with the increase in their business, necessitates their removal from their old premises to new ones.

The general idea which we are apt to entertain of the extent of the manufacturing industry of Great Britain is always a vague and limited one, however enlarged we may think it to be, and it is certain to be very much increased whenever we have an opportunity of being well informed with respect to some special business, however inconsiderable a section it may at first sight appear. The more we go into detail,—the more minute and precise our researches are,—the greater the extent embraced by trade will appear, and it will be only by taking as a datum what we do know of some businesses as an index to what we have not an equal opportunity of examining into that we are able to form an adequate idea of the multifarious ramifications of commerce. With regard to that simple article vinegar, we see it on the table in tablespoonfuls in the cruet-stand, and we know that it is largely used by the pickle manufacturers, and in a smaller way when that manufacture becomes domestic. But we are much surprised when we find that, at the last revenue return of the vinegar duties, just before that duty was repealed (in July, 1844), duty had been paid during that year by the vinegar manufacturers upon 2,828,043 gallons, and that they had at that time in store 3,901,568 gallons which had not paid duty. In looking at these figures the importance of this manufacture is manifest. Since that time it has much increased. The sale of vinegar by Messrs. Hill, Evans, & Co., at that time amounted to 153,875 gallons, and their stock in store to 291,689 gallons; but their manufacture and business has now increased, and to carry out the demands upon them they have almost entirely rebuilt their Worcester manufactory, so as to extend it upon a much larger scale, and it now quite rivals in the size of its buildings, vats, and machinery any one of the great London breweries. Their tun-room contains above thirty vats, the five largest of which will each hold 80,000 gallons of vinegar, and their present year's sale will amount to quite 2,000,000 gallons, being equal to considerably more than two-thirds of all the vinegar manufactured in 1844 by the whole of the trade.

Their building in Eastcheap has a frontage of 48 ft. on the street, by a depth of nearly 100 ft. It contains two tiers of cellars below the ground floor, and has four square floors above it, with some rooms in the roof. The style adopted by the architect, Mr. R. L. Roumieu, is the Gothic of the south of France, with a Venetian impress; and the design, if a little overdone, may be considered picturesque and original. As the rooms were intended for offices in a narrow street in a city having a dull atmosphere, large openings for light became a necessity, and have been provided. In this composition a depth of shadow is obtained by the thickness of the walls, and the variety which the contrast of colour here introduced gives it affords all the relief in that respect required. The materials used are red and black brickwork, the arching being moulded bricks; the stone is from Tisbury—the same as that used in Salisbury Cathedral; and the roof is covered with variegated slating.

The contractors are Messrs. Brown & Robinson, who are executing the Smithfield Market Improvements for the City of London Corporation. The carving was done by Messrs. Frampton & Williamson, from drawings by the architect, and is executed cleverly. Messrs. Simpson did the external and internal tile work, and Messrs. Peard & Jackson most of the ornamental ironwork, the whole of which was designed by the architect for this building. The amount of the contract was 8,170*l*.



WAREHOUSE, IN EASTCHEAP, LONDON.—Mr. Roumieu, Architect.

## THE CRAWLEY EXHIBITION OF PICTURES.

The committee have succeeded in gathering together 136 paintings and drawings in water colour, the majority of them good works. Thirty-two of them are contributed by Mr. George Smith (of Pimlico, and known to many of our readers), from his handsome new residence in Worth, including an early picture by Constable, a "Water-mill" by Müller, a capital drawing by Paul Sandby, "Windsor Castle;" and Mr. F. Chester sends a portrait of Mr. Mark Lemon, a clever work, though a little exaggerated. Mr. O'Niel's "Volunteer" is a striking feature; equally so his "Landing of the Princess Alexandra at Gravesend." Works of more or less importance, by Danby, Solomon, Miss Solomon, Miss Mutrie, Millais, Horlor, G. Chester, E. W. Cooke, John Philip, Creswick, F. Stone, Birket Foster, H. Warren, and other well-known artists, cover the walls. The next time an endeavour should be made to obtain a better lighted room for the exhibition.

## CONDITION OF BIRMINGHAM.

The importance of the object aimed at will sufficiently excuse us for reproducing the following articles:—

*From the "Birmingham Daily Post."*

"The discussion in the Health Department of the Social Science Association, on Thursday, turned upon a subject which has often engaged attention in this place, and as to which we have repeatedly censured the local authorities for want of public spirit. A paper was read 'On the Functions and Authority of Medical Officers of Health;' and its treatment led to the expression of opinions which, considering the sources whence they proceeded, ought to receive serious attention from the people of this town. In Birmingham we have no medical officer of health; and, notwithstanding repeated agitation of the question, the Town Council remain adverse to the creation of such an office. The members of that body—at least the majority of them—take refuge in the fact that the rate of mortality in the borough is moderate when compared with the scale prevailing in other large towns. As Birmingham people die on an average at the rate per annum of about 24 per 1,000, and in many large towns the ratio is higher, our aldermen and councillors appear to think that they stand well in the comparison, and that, therefore, they are not called upon to incur the expense of engaging a special officer to take charge of the health of the people. The mayor, on Thursday, put the case thus:—'In Birmingham, the governing body paid a strict and critical attention to the funds of the public, and they wanted to be convinced by facts, as well as arguments, that some definite results would follow the appointment of such an officer as now recommended.' In order not to find these facts, they turn their faces, when seeking them, only in one direction. They look alone to other great towns, where matters are even worse than here, and finding that to be the case, they say Birmingham is already a model town in respect to sanitary condition, and no money ought to be thrown away on the folly of endeavouring to improve it. They go even further than that, for some of their observations imply that, as people die faster here than in some towns which have a medical officer of health, the influence of such an officer appears to be the reverse of remedial. If, instead of this, they would look to the mortality of the country at large, they would find that the mortality of Birmingham ranged annually at about four per 1,000 above the average,—which signifies that about 1,400 more persons die every year in Birmingham than would die if the same people had not the misfortune to live in overgrown, overcrowded, and unwholesome neighbourhoods. That Birmingham is as good as the rest of these towns,—or even a little better,—is no answer to the grave charge which these facts sustain. What the corporation should aim at is to make it as healthy as the general average of the country; and if they kept that object in view, they would inevitably be led to see the necessity of appointing to the charge of public health a more competent officer than any now belonging to their inspection staff.

Examples of deleterious influences abound in the borough. Two at once present themselves to notice. The filthy stream entitled the river Rea, and that other abomination, the Hockley Brook, are little better than two sluggish currents of poison. Not only does their quality show itself in the very look, but facts which should be notorious to the public show that their shores are the home and abode of disease. The inspectors of nuisances may answer very well for the purpose of discovering and prosecuting instances of individual neglect in regard to cleanliness, but wholesale propagators of disease, such as these two open drains, are beyond the functions of those persons. What we want is an officer competent and empowered to investigate remote causes of disease, and so to raise the sanitary condition of the place in a sensible manner. Compelling the removal of what are termed nuisances may prevent our getting worse, but in order to get better we must have the services of a man who can look deeper into the matter than a police-constable, and can make suggestions as to the attainment of radical improvements. An illustration of this difference is to be found in what lately occurred just on the outskirts of what is technically called the borough. In a part of the Balsall Heath district the people were found to be dying rapidly of fever, and the attention of the local Board being thus attracted to the spot, it was ascertained that the epidemic arose from the want of wholesome water. People whose business it is to hunt up cases of pig-keeping or ash-pit neglect would never have thought of this neglect had not the prevalence of a destructive malady forced it upon their attention. As a well-qualified officer of health would immediately lay his hand on such a want of sanitary provision, we say without hesitation that many lives have been sacrificed at Balsall Heath to the non-appointment of such an officer; for it must be remembered that the absence of good water had been long preying on the inhabitants before the febrile outbreak which led to its being remedied.

Some examples of the present condition of Birmingham were presented to the Section on Thursday, by one of the members of the Association. Mr. Godwin,—to whom the public are indebted for such useful service,—had personally visited, under the guidance of the chief of police, some of the central parts of Birmingham. The result of his examination is given in the following passage from his observations in the Section:—

'He did not wish to say one word that might be objectionable to the authorities of Birmingham, but he wished to raise his voice in favour of humanity. On the previous day, aided by the Chief of Police in Birmingham, he (Mr. Godwin) visited some of the districts in the centre of the town, which presented conditions that seemed to him most extraordinary, considering the very fair death-rate which Birmingham had been able to boast. In more than three-fourths of the whole of the streets in the district he visited he found houses tumbling down, no windows, floors torn up, pavements retaining decaying matter, and of a character always to retain it; an utter want of closet accommodation. In Balloon-street he found double houses, the rooms full of people, and the middens all full. In No. 5 Court, Brick-kiln-street, the neighbouring cesspool of the court was some 3 ft. higher than the pavement of the court; and the consequence was that the filth was constantly oozing through, and spreading over the floor of the court. The first woman he inquired of in one of the courts had three children living, and she praised the locality as being very healthy. Then he elicited from her that she had five children dead. Next door the woman had no children dead, but her husband, she added, had been invalided for many months. In a court in Staniforth-street, an open cesspool was to be seen—that is, the closet ran into what was prepared to be a midden, but not being so used, was simply filled with fæcal matter. Here again there was the same appearance on the part of the children—pale faces, sunken eyes, women worn and haggard, and throughout the whole of the inquiry he did not meet with a single child who was able to read. Here, then, was what he begged leave to point out to the authorities of Birmingham—an enormous population, living under conditions utterly opposed to anything like health. Whether any attempts were made to remedy this he could not say, but at any rate they must have been very insufficient. He could go through a large number of similar cases, but he did not think it necessary. Here, in these wretched districts, were growing up in ignorance and dirt girls and boys, with no other prospect than the streets for the one and the gaol for the other. Where, he asked, had been the ministers of the Church? It was quite possible that he might expose himself to some obloquy for these observations; but the fact still remained that there were hundreds of children growing up in a lamentable state of ignorance, and under a condition which ought not to exist.'

Having ourselves been instrumental in collecting and publishing numerous cases of a similar kind, both as to the town and the populous district adjacent to it, and having striven by every means at our command to impress on the local authorities the necessity of taking greater precautions than are possible under present arrangements, we rejoice at receiving this additional testimony from the independent inquiry of a competent visitor. We can only say further that, if the facts stated by Mr. Godwin, and the arguments advanced in the Section, do not obtain serious notice on the part of our authorities, we trust that they will be well considered by the great mass of the persons by whom local authority is conferred."

*From the "Daily Telegraph."*

"Sensational narratives of travel and adventure, such as those which are frequently related at the meetings of the Royal Geographical Society, are scarcely expected at the quieter gatherings of the Social Science Association. No tale of an African or Asiatic wanderer, however, can rival in pathetic interest the recital of certain recent explorations made by Mr. George Godwin, and reported by him to the Health Department of the great Congress now assembled at Birmingham. Mr. Godwin is an old and experienced traveller. Few men are more familiar with what may be called the savagery of civilization; few men have penetrated deeper into those foul regions which still disgrace our large cities; few men have devoted more energy and courage to showing one half of our English world how the other half lives—and dies. It is true that he has visited only Bethnal-green, not Borrioboolahgah; true, that he is less familiar with Whydah than Whitechapel. The 'natives' whom he knows are not black; they would even be white, if they had any water to spare for washing purposes; as it is, they are only dirty and grimy Christians, subjects of her Majesty Queen Victoria. Still, such as they are, they happen to be our fellow-creatures; and it may some day be admitted that they deserve almost as much attention as Sambo himself. To the praise of novelty Mr. Godwin's narrative can hardly lay claim. It is—to the shame of this country be it spoken—exactly like a hundred other reports, made by a hundred other explorers. As we examine its melancholy, squalid, repulsive details, the painful thought arises that we have heard them all before; that a story which ought to shock the conscience and awake the manhood of the whole land is really trite and stale, has been told over and over again, and will yet have to be repeated scores of times before the country is roused to anything like earnest action. Let us accompany Mr. Godwin on his latest excursion; and, revolting as the details may be, we must here use the plainest language, for that alone can convey the full truth. The traveller set out one morning, with a sergeant of police for his escort. Avoiding the main streets, the larger manufactories, and the comfortable hotels, he went into the heart of Timbuctoo—we beg pardon, Birmingham—and diligently examined two districts, about a mile in extent. So far as regards mere distance, therefore, the journey was no very startling feat; and yet the news that the traveller brought back ought to startle us, if it does not. For, in the centre of a thriving and busy town—one of the healthiest, for its extent, in England, and inhabited by a community which is eminently practical and enterprising—he found that the houses were miserably dilapidated, that the pavement was covered with decomposing matter, that the rooms were scandalously overcrowded, and that court after court was unprovided with the ordinary requisites for decent and wholesome living. In one of these places, the soil from an adjoining cesspool was percolating through the boundary wall, and filling the air with a sickening and deadly stench. Of course, so experienced a traveller found little difficulty in communicating with the natives. The first to whom he spoke was a woman, and her story was as painful as it was significant: she had had eight children; three of them were living—but five were dead. The next had to say that her husband was invalided—and these were but 'samples' of many others. In one court the 'midden' was simply a great open cesspool; and it is scarcely surprising to be told that the children here 'were pale and wan, with staring eyes'—a touch of reality which should surely bring the picture vividly before us. Do we require to add that these children, one and all, were unable to read? Turning these matters over in his mind, the audacious explorer was absolutely bold enough to say, 'Here, then, hundreds of children are brought up without health, without knowledge of anything but evil; and I feel bound to ask, not merely whether the authorities have exercised the powers they possess, but whether the clergy of the neighbourhood have done their duty.'

The audacious traveller ceased; and a mild, simmering murmur of discussion broke forth. We have said that, to us, the statements of Mr. Godwin are not particularly novel or surprising; but we are bound to admit that there was one

person to whom they seemed altogether fresh; and, strangely enough, the learner was none other than the Mayor of Birmingham himself. One might have thought that he, of all men in the world, should know,—nay, was bound to know,—the sanitary state of that town which he ruled as chief magistrate; and so, indeed, in a certain sense, he did. He knew,—for there were figures to tell him,—that Birmingham, as compared with other great centres of industry, was one of the healthiest places in England; but he did not know,—since something more than statistical tables would have been required to teach him the less paraded fact,—that large districts of Birmingham were still in a sanitary condition which was not merely disgraceful, but dangerous. To our mind, this amiable unconsciousness of the Mayor is the saddest as well as the strangest part of the whole story. Here is a gentleman,—presumably humane and intelligent,—who, from his official position, should know more about Birmingham than all other men; and yet he has to be told, by a stranger coming down from London on an entirely different errand, that all the elements and conditions favourable to pestilence abound in the very heart of the town which he governs. 'The authorities,' said the good Mayor, 'were generally in favour of a recognised officer of health; but they had to economise the rates, and did not wish to adopt a plan on the subject until they were satisfied it would be attended by definite and satisfactory results.' Is it safe to have a large open cesspool in the middle of a crowded court? Perhaps not; but 'we have to economise the rates.' Is it prudent that we should offer a standing invitation to pestilence, keep typhus constantly among us, and assure cholera of a triumphant career when it arrives? Perhaps not; but then 'we have to economise the rates.' The true economy would be to disinfect those places with chloride of lime, to drain them thoroughly, and provide them with the ordinary appliances of decency; but no—the local authorities are saving the article of chloride of lime, and trusting to the chapter of accidents as regards the article of coffins.

We should be sorry to convey the idea that the mayor of Birmingham is one jot worse than his neighbour. In such matters, to quote Hood's words, 'Evil is wrought by want of thought, as much as want of heart.' Apparently, the worthy gentleman had never given serious consideration to the subject; obviously, he was taken aback by Mr. Godwin's explicit statement. And it is just the same, we are honestly convinced, with the authorities in many other towns. They know the main streets, the houses of the gentry, of the shopkeepers, and the manufacturers; but they far too rarely turn aside from the chief thoroughfares into the dingy alleys and courts that lie apart. When those magnates are not wilfully obstinate, but merely ignorant, the knowledge that sanitary reform is wanted may lead them to bestir themselves. We are not, however, exceedingly sanguine of that result. In Liverpool, which is now sometimes cited as an example, years were allowed to pass before the authorities could be roused to anything like earnest action. The untiring industry, the indomitable perseverance, the dauntless courage of one man—Mr. Hugh Shimmin—at length bore fruit; but for years his statements were denied, his passionate earnestness was ridiculed, and his motives were maligned. Such is too frequently the reception accorded to the sanitary reformer. He has to brave danger of no light order; he has to undergo toils that are not merely arduous, but noisome; and his rewards are misconception, calumny, and abuse. Much, indeed, has been done of late years in the right direction, but in many cases it has only been done under the influence of alarm; and, as we look mournfully around us, and contemplate the immensity of the work which yet remains to be accomplished, there are moments when we almost apprehend that the only 'Sanitary Reformer' to whose teachings men will really listen is one whose visits, when they do occur, are long remembered,—Asiatic Cholera."

## PROVINCIAL NEWS.

*Chesterfield.*—The Sheffield Banking Company, who have for some time past had a branch bank in Chesterfield, purchased the old Manor-house, in the Market-place, and have rebuilt and remodelled it the better to accommodate their extending business. The architectural style of the old house, erected about the close of the seventeenth century, has been studied in the new building. The exterior is built of Darley Dale stone, the roof being covered with small green Westmoreland slates. The front, with three gables and tall chimney-stacks, has mullioned and transomed windows and an arched and panelled doorway, with an oak door, panelled and countersunk. The banking-room is 27 ft. by 18 ft. It has a ribbed ceiling, and is lighted by three windows. There is a fireplace of Derbyshire marble. Adjoining is the manager's room, with lavatory, fireproof safe, &c., and the house for the resident agent is comprised within the building. The staircase from the hall, leading to the upper floors, is a reproduction of the old one. It is lighted by a tall mullioned window, filled with geometrical glazing; and a floor of mosaic tiles, executed by Messrs. Maw, from the architects' design, gives a finish to the whole. Mr. John Milner, of Sheffield, has executed the works from the designs and under the superintendence of Messrs. M. E. Hadfield & Son, of Sheffield, the architects; Mr. John Pearson having acted as clerk of the works.

*Ipswich.*—The new Roman Catholic Convent, dedicated to St. Mary, and situated on the grounds immediately adjoining the Roman Catholic Church of St. Mary, Woodbridge-road, Ipswich, has been opened in the presence of a large congregation, by whom the convent chapel was filled. The structure is about 130 ft. in length by 35 ft. wide, but when completed wings will be added on either side. That portion of the building which was opened, has been in course of construction for a year past. The style of the building is Gothic, treated with much freedom, in order to be adapted to the purposes for which it is intended and the requirements of the time, and there are large arched openings for light and air. The northern side of the building is occupied by wide corridors which run from end to end, and to which the rooms, all of which look to the south, open. At either end is a flight of stairs, whilst in the centre is the principal staircase. The lower corridor is lighted by shafted windows with arched heads and pierced tracery, and there is a large porch surmounted by a cross, and paved with Mosaic tiles. Bands of black bricks give relief to the red, which form the principal material of the building, the springings being of yellow in the cornices and window heads. The principal room on the ground floor is an exhibition-room, 50 ft. in length, and on the first floor are class-room, music-room, and infirmaries, the upper floor being devoted to dormitories, &c. Mr. Goldie, of London, was the architect; and Mr. R. S. Smith, of Ipswich, the contractor.

## UNIVERSALITY OF DRAWING IN CONTINENTAL SCHOOLS.

Sir,—At the meeting of the Social Science Association at Birmingham for the present year, the Earl of Carnarvon remarked, in reference to education, that "if there be one branch of instruction more valuable than another to the artisan, it is drawing." He might have said to all; and yet up to this present time drawing has scarcely been recognised at our public schools, except as engaging an hour on half holidays! I have been at the trouble of ascertaining how much time is given to the various kinds of drawing in some public schools on the Continent, and I send you the results in respect of four of them.

Felix Summerly.

VIENNA.—POLYTECHNIC INSTITUTE.

NUMBER OF HOURS PER WEEK DEVOTED TO DRAWING IN THE VARIOUS DIVISIONS.

| | Preparatory Division. | | | | Engineering Division. | | | | | | Architectural Division. | | | | | | Mechanical Division. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st Year. | | 2nd Year. | | 1st Year. | | 2nd Year. | | 3rd Year. | | 1st Year. | | 2nd Year. | | 3rd Year. | | 1st Year. | | 2nd Year. | |
| | W.T.* | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. |
| Descriptive Geometry | 8 | 8 | | | | | | | | | | | | | | | | | | |
| Practical Geometry | ... | ... | 6 | 6 | | | | | | | | | | | | | | | | |
| Machine Drawing | ... | ... | ... | ... | 6 | 6 | ... | ... | ... | ... | 6 | 6 | ... | ... | ... | ... | 10 | 10 | 15 | 15 |
| Building Construction | ... | ... | ... | ... | 8 | 8 | 15 | 15 | 15 | 20 | ... | ... | ... | 6 | ... | ... | 6 | 6 | | |
| Architectural Drawing | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 8 | 8 | 14 | 14 | 15 | 15 | | | | |
| Freehand Drawing | 6 | 8 | 8 | 10 | | | | | | | | | | | | | | | | |
| Perspective | ... | ... | ... | ... | ... | 6 | ... | ... | ... | ... | ... | 6 | | | | | | | | |

ZURICH.—POLYTECHNIC SCHOOL.

| | 1st Division.—Builders. | | | | | | 2nd Division.—Civil Engineers. | | | | | | 3rd Division.—Mechanical Engineers. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st Year. | | 2nd Year. | | 3rd Year. | | 1st Year. | | 2nd Year. | | 3rd Year. | | 1st Year. | | 2nd Year. | | 3rd Year. | |
| | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. | W.T. | S.T. |
| Descriptive Geometry | 4 | ... | ... | ... | ... | ... | 4 | ... | ... | ... | ... | ... | 4 | | | | | |
| (1) Architectural Drawing | 4 | 4 | 4 | 4 | ... | 4 | | | | | | | | | | | | |
| Landscape Drawing† | 4 | 4 | ... | 4 | ... | 4 | | | | | | | | | | | | |
| (2) Building Construction | ... | 8 | 6 | 4 | 6 | 4 | 4 | 4 | 6 | 6 | 6 | 6 | ... | 4 | | | | |
| Ornament (Dessin d'Ornement) | ... | 4 | 4 | ... | 4 | | | | | | | | | | | | | |
| Figure (Dessin de Figure) | ... | ... | 9 | 9 | | | | | | | | | | | | | | |
| Perspective | ... | ... | ... | 3 | | | | | | | | | | | | | | |
| (3) Machine Drawing | ... | ... | ... | ... | ... | ... | 4 | 4 | ... | ... | ... | ... | 8 | 6 | 8 | 12 | 6 | 12 |
| Plan Drawing (Dessin de Plans) | ... | ... | ... | ... | ... | ... | 3 | 3 | | | | | | | | | | |
| Map Drawing (Dessin de Cartes) | ... | ... | ... | ... | ... | ... | ... | ... | 3 | 3 | 3 | 3 | | | | | | |

(1) In Architectural Drawing I have included "Dessin d'Architecture" and "Exercices de Composition d'Architecture."
(2) In Building Construction I have included "Dessin de Construction" and "Exercices de Constructions."
(3) In Machine Drawing are included "Construction de Machines," "Exercices de Construction de Machines," and "Dessin de Machines."
* W.T.—Winter Term. S.T.—Summer Term.
† Not compulsory.

In the 4th Division—Chemists,—"Dessin Technique" is taught 9 hours W.T., 4 hours S.T., in the 1st year, and 4 hours W.T. in the 2nd year.
In the 5th Division—Foresters,—"Dessin de Plans" is taught 3 hours a week during the whole of the 1st year.
In the 6th Division—Natural Science,—there is only one year of study. In the winter term perspective is taught 1 hour per week, landscape drawing 4 hours, and figure drawing 9 hours; in the summer term, landscape 4 hours, figure drawing 9 hours, and ornament 4 hours per week.

[Berlin.

### Berlin.

For the Royal Trade Institute (Königliches Gewerbe Institut), which is equivalent to a Polytechnic School, there is no return of the number of hours per week devoted to the different subjects.

At the Berlin Practical School (Königstadtische Realschule) the number of hours given to drawing (no distinction between the different descriptions of drawing) in the respective classes is as follows :—

| | | |
|---|---|---|
| 1st (or highest) Class | (2 years) | 3 hours per week. |
| 2nd Upper | (1 year) | 2 ,, |
| ,, Lower | (1 year) | 2 ,, |
| 3rd Upper | (1 year) | 2 ,, |
| ,, Lower | (1 year) | 2 ,, |
| 4th | (1 year) | 2 ,, |
| 5th | (6 months) | 2 ,, |
| 6th | (6 months) | 2 ,, |
| 1st Elementary Class | (1 year) | 2 ,, |
| 2nd ,, | (1 year) | — ,, |

Total for the whole school nineteen hours per week.

### Stuttgart.—Polytechnic School.

Number of hours per week devoted to drawing :—

*Mathematical Division.*

*First Class.*

| | |
|---|---|
| Descriptive Geometry | 6 |
| Plain Drawing | 2 |
| Freehand do. | 4 |

*Second Class.*

| | |
|---|---|
| Descriptive Geometry | 4 |
| Applied do. | 3 |
| Architectural Drawing | 2 |
| Freehand do. | 4 |

*Commercial Division.*

| | |
|---|---|
| Freehand Drawing | 2 |

*Technical Division.*

| | |
|---|---|
| Freehand Drawing | 6 |
| Ornament and Modelling | 18 |
| Machine Construction | 18 |

## MILFORD HAVEN AND ITS PROSPECTS.

In reading the article in the *Builder* of the 12th inst. respecting the failure in launching the *Bermuda*, I was forcibly struck with the feasible plan you recommended for the future construction of iron monsters, and of the appropriateness of the place you named for the purpose.

With regard to the latter—the place—I now wish to offer a few remarks. The vast water shed of Milford Haven is not only capable of any number of such structures being built in the manner you proposed ("floating on the surface of the water"), and leaving ample room for the whole of the traffic of the kingdom, if needs be, besides, but its banks on either side are filled with creeks, or *pills*, as they are termed in that locality, which are docks that are already formed by nature, from which the water might be excluded at a trifling cost for such purposes, and where the building of gigantic pieces of naval architecture could be carried on without inconvenience on the dry land, whence, after being completed, they could, without blow of hammer or strain of wedge, be floated gently out into the bosom of the deep.

The situation of Milford Haven is adapted for such purposes on account of its proximity to the great iron districts of the country. Merthyr Tydvil is within easy distance by rail, and the whole country around it abounds with iron ore of the purest quality, that only wants enterprising capitalists to bring its entire manufacture, for the uses above named, on its very shores.

A few years ago a small iron smelting-furnace was built at a place called Stepaside, fifteen miles from the banks of the Haven, where, from native ore, iron is made that is not surpassed in quality by any in the kingdom. Hundreds of tons of the ore supplied to that furnace cost no further labour to procure than to pick it up from the contiguous beach. In a three-miles' walk along the shore from the beautiful and fashionable watering-place, Tenby, to a village called Saundersfoot, which is in the neighbourhood of the Stepaside furnace, the pedestrian can see the sides of the cliffs teeming with iron ore, and under his feet lie thousands of tons smoothed and rounded into the form of pebbles by the motion of the tide. About two miles from Tenby, and nine miles from the Haven, a valuable vein of hematite ore has been discovered, which the proprietor of the Stepaside works has been for some time working. Coal, also, abounds in the neighbourhood, and it is the home of the mountain limestone. All the buildings about that part of the country are constructed of the native limestone, so that the materials are all at hand and only want capital to develope them.

Besides iron, coal, and limestone, the district yields the finest black marble, which is procurable in very large blocks, clays from which very superior fire and common bricks are made, and a sand that has been pronounced excellent for making glass. Wages in that locality are lower than in any part of the country. We believe the highest class workmen in Pembroke Dockyard are not paid more than twenty-six shillings a week.

With all these advantages, and now that it has direct railway communication with all parts of the kingdom and a through narrow-gauge line to the North, Milford Haven must become a place of vast importance, and those who are there first in the race are the more likely to become the most successful men.

One who knows Milford.

## RAILWAY STATIONS.

The extension of the railway system has brought the stations so close together, that it becomes necessary, for the despatch of business, that even half-minutes should not be lost. Why should not all the *employés* at each station wear a band on their caps, with the name of the station legibly worked white upon black, or the reverse; and on long journeys, where intervals of sufficient time exist, why should not the guards, even, change their band, after passing each station, to the name of the next. The unintelligible manner in which the stations are announced in some districts warrants this simple expedient, which, I fear, is so simple that it will not be adopted. If objection be made that the porters are sometimes shifted, a remedy might be adopted in making the band removable, like the armlet of the policeman.

Should not the names of all stations be placed at right angles to the road? and when the place is important, should not the name be painted in gigantic letters on each end of the station?

W. H. B.

## GENERALISATION IN ARCHITECTURAL EDUCATION.

Sir,—Many thanks for the article on this subject, which I have read carefully, with much mingled pain and pleasure. With pain, because I once more see that others think as I do, viz., that I have been turned out ready to earn a living,—as my friends think,—without having learnt anything, but that I know *nothing*. With pleasure, because I trust that such articles as this will be the means of preventing others madly following in my steps.

The question which those who have blindly fallen into error want answered is, how are they to obtain the education which they require?

Their *education* is supposed to be over; their friends say, "You must now support yourselves;" but they themselves see and know that they are altogether ignorant. They can copy and trace, and may be able to earn an honest living by hard work as draughtsmen; but they want to do more, they wish to live a pleasurable life: how is this to be done?

If a college were started, they would find it difficult work to persuade their friends to go to the expense of commencing their education again.

Their fate is a sad one, and they cannot see any helping hand outstretched to assist them. The Royal Academy offers them a studentship and prizes, but here its aid stops; there is no education except in perspective.

Where are they to look for light? If they are to remain in their present darkness, they are of all men the most miserable; but there is one who hopes for light, and believes it will not be long before it shines forth.

Adelphi.

## COST OF CONCRETE TANKS.

Sir,—Can any of your readers give me an idea of the cost of constructing concrete tanks to hold 100,000 and 250,000 gallons respectively, and to be arched over.

J. A.

## BIRMINGHAM NOTES.

The makers of builders' hardware in Birmingham are receiving orders from the Northern and Eastern Counties, such as indicate a considerable improvement in building operations in those parts of the country. A fair proportion of these are railway and other engineering works, but all the railway-ironwork establishments are not yet employed to their full extent; and, indeed, one of the most extensive in the neighbourhood of Birmingham is only occupying about half its usual complement of hands. Among the recent novelties in the lighter branches of builders' hardware, may be mentioned a new and highly-decorated ceiling rose in stamped metal, introduced by Messrs. Winfield & Co. This artistic production will do much to favour metal roses in preference to those of Roman cement or wood.

The same firm have done much to facilitate the ornamentation of metal tubes, an operation now performed by machinery by an almost instantaneous process. It is noticeable that Birmingham is making steady progress in the art-workmanship of its iron and metal wares; and although, perhaps, to a somewhat less extent, the same remark will apply to similar productions in the neighbouring district of South Staffordshire. Foreign competition in some branches continues severe, and a reduction in the cost of production has been the natural result. In one branch, for example,—metal cornice-poles,—which are largely made on the Continent, the Birmingham price has fallen 50 per cent. during the past few years.

## BRICK-KILNS TO BURN THEIR OWN SMOKE.

At the Bradford Borough Court, the Town Clerk recently appeared in support of an information against Mr. Joseph Wilson (Messrs. J. Wilson & Sons, builders, White Abbey), for causing a nuisance in Carlisle-road, Manningham, by the smoke from a brick-kiln. There was no difficulty whatever, he said, in bricks being made without causing the least nuisance if the necessary precautions were taken, and it was a mere matter of expense. An enclosed circular kiln could be formed, and when it was charged and fire applied to the first batch it was allowed to get to a red heat: the other fires were then lighted, and the smoke passing from the kilns was entirely consumed, so that very little except vapour passed into the tall chimney. There was a kiln of this kind in full operation in the town, and he believed with these facts before their eyes the magistrates would see that the nuisance could be abated. He did not ask for a penalty, but for a prohibitive order, and the bench could fix the date when they chose. Evidence was led to prove that the kiln in question did not consume its own smoke, and that such smoke consumption was quite possible.

The mayor decided that the defendant be allowed to continue his works until the 1st of January, if a promise were given that no more kilns should be built, and the utmost vigilance exercised to render the smoke as light as possible.

It was agreed that this should be done as far as practicable; and an order was then made for abatement on the 1st of January, 1869, the defendant to pay the costs.

## FEVER HOSPITAL COMPETITION.

A fever hospital is to be erected at Hampstead for the Metropolitan Asylum District, and a limited number of architects were invited to submit designs; namely, Messrs. P. Gordon Smith & G. A. Dunnage, Saxon Snell, Pennington; Brereton, Son, & Brereton; F. Fowler, and Edmeston. The designs are now before the Board. Other hospitals are about to be erected for the metropolis by the same Board.

## PROPOSED NEW PIER AT SCARBOROUGH.

The Scarborough Harbour Commissioners, in March last, advertised for designs for a new western pier. At a special general meeting last week, the first premium of 50*l.* for the best design was awarded to Mr. Charles W. Whitaker, of 28, Woburn-place, Russell-square; and the second premium, of 30*l.*, to Messrs. Shelford & Robinson, Victoria Chambers, Westminster.

## FROM IRELAND.

*Dublin.*—The Roman Catholic church of Ballybohill, county Dublin, is to be remodelled internally, with alteration of gallery and addition of pews, &c.; also to have a new octagonal tower at south-east angle, surmounted by a timber and slated spire, terminated with ornamental metal vane. Mr. J. J. Lyons is the architect.

*Sligo.*—Farm buildings are being erected at Heapstown, county Sligo, for Capt. McTernan, according to plans, &c., by same architect.

## BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

A general meeting of the friends of this institution was held on Monday, the 5th inst., at the offices, Bedford-row, to evidence its success by the election of the widows of two builders' clerks as pensioners on the relief fund. The chair was taken by Mr. S. J. Thacker (Messrs. Holland & Hannen); and the poll was opened (at 7·30 p.m.), the result of which is shown in the advertisement. It is rather less than two years since we had to record the founding of this institution by the public meeting presided over by Alderman W. Lawrence, M.P., and since then at various times appeals have been made to the trade and public on its behalf in our pages. The necessity that compelled the

committee to make use of the funds at the earliest moment prescribed by the rules shows that the institution has not been established at all too soon. The committee are now canvassing for and will gladly receive proxies for the next election at the Orphan Working School, Haverstock Hill.

## CHURCH-BUILDING NEWS.

*Crowmarsh Gifford.* — The newly-restored church of Crowmarsh Gifford, near Wallingford, has been re-opened. The work of restoration has been carried out by Mr. Moses Winter, of Wallingford, under the direction of Mr. J. H. Hawkewill, of London. The cost of the work is about 600*l.*, and comprises the entire removal of the old roof, restoring the same, and making an open roof to the nave; putting in new lancet windows to correspond with the old Norman style of the building, removal of the gallery, taking out the large old pews, and reseating with benches of stained deal.

*Llanbrynmair* (*Montgomeryshire*).—The new church of St. John has been opened for divine service. The architect was Mr. David Walker, of Liverpool. The plan is that of a nave and chancel under one roof, the east end of the chancel terminating in an apse. The internal length, from east to west, is 68 ft., the chancel and sacrarium taking up nearly one-half, and the width is 21 ft. 6 in., with a height, from floor to ridge, of 31 ft. There is a vestry on the north side. A dwarf stone screen divides the nave and chancel. The roof of the nave is open-timbered to the ridge, and plastered between the rafters. The chancel roof, which is of a polygonal form, is boarded, the intention being to decorate it in colour, when the funds permit of that being done. The church is fitted up with open benches of varnished deal, and kneeling accommodation is provided for about 230 persons. The central aisle to the nave is paved with 4-in. buff and blue tiles, laid to a design by the architect. The chancel tiles, which were supplied by Mr. Godwin, of Lugwardine, are of a more elaborate kind. The architecture of the external elevation of the church is Twelfth Century Gothic, and has much of the character of Early French work. For the walling, which is of broken coursed work, stone of a deep blue colour, obtained from a quarry in the locality, has chiefly been used, but bands of light blue stone are introduced. The nave windows are coupled lancet lights, the heads and sills being of Cefn stone. The east windows, and that on the south side of the chancel, are two-light windows, filled in with plate tracery. The stonework of the west front is carried up above the roof, to a height of about 45 ft., forming a belfry, with space for three bells. Only one bell, however, has yet been provided, and that is of cast steel, from the foundry of Messrs. Vicars & Co., at Sheffield. The roof is covered with Machynlleth slates, surmounted by a red clay crest of peaks, manufactured from the architect's design. The chancel portion is of an enriched character, the apsidal end and the junction with the nave roof being marked by hip blocks and ornamental wrought-iron crosses. Provision is made for warming the church, in the cold season, by means of underground flues. The windows are glazed with Bowen's patent interlocking glass, in two colours, obtained from Messrs. Forrest & Co., of Liverpool. The church has been built by Mr. J. Harrison, of Newtown, under the superintendence of Mr. Walker, the architect. The cost will be about 850*l.*

*Clifton* (*Bristol*).—St. Paul's Church has been reconsecrated and reopened. The west end has been entirely rebuilt. The centre portion has been raised about 15 ft., and the pitch of the roof has been somewhat increased. The aisle roofs remain at the same pitch. Two projecting buttresses, with gabled heads, separate the nave from the aisles, and divide the front into three compartments. The principal feature is the grand entrance doorway, projecting from the face of the wall, and finished with a gabled roof, surmounted by a carved finial; the jambs have triple shafts of polished granite with carved capitals. The arch is moulded, and has two rows of carved foliage. Above this doorway are two windows of two-lights each, with tracery, and in the gable a circular window containing three trefoils. The ends of the aisles have three-light windows and small trefoil gable lights. A new entrance, enclosed by a gabled porch, has been made at the west end of south aisle, thus giving additional means of ingress and egress. This porch has been composed out of the old materials of the former porch. Other portions of the old porch have been used inside the building. The disparity in size of the tower and spire is rendered still more apparent by the additional height given to the nave. A new tower and spire, in proportion with the rest of the building, at the south-west corner, are recommended by the architects, and shown in the design first submitted by them to the committee. Beyond building on the old foundations, the interior may be said to be entirely new; all the old windows have been cut out and new tracery inserted; the inside arches of the windows have been changed and made more pointed. The greatest change effected is the raising of the centre roof and the addition of the clearstory windows. The next is the formation of a distinct chancel, separated from the nave and aisles by moulded arches, and furnished with stalls, sedilia, credence, &c. The nave arcade is executed entirely in stone; the shafts of the pillars are circular, of red Mansfield stone, with carved capitals. The chancel arch is carried up as high as, and agreeing with, the arched principals of the nave roof. The transept arches have been raised considerably, and rest in the centre upon a clustered shaft of red Mansfield stone, and at each end in small corbelled shafts of the same kind of stone, the whole having carved capitals. The floor is everywhere filled in above the brick vaults with concrete, and the chancel and passages in nave and aisles are laid with encaustic tiles: those of the chancel are by Messrs. Maw & Co., and the remainder by Mr. Godwin, of Hereford. The roof of the nave is open, having seven arched principals filled in with tracery, the whole being covered with diagonal boarding. The chancel has an arched ceiling of wood, divided into panels by arched mouldings, springing from a carved stone cornice. The aisle roofs are boarded, and have arched principals at every bay. The carving of foliage to capitals, cornices, &c., was executed by Mr. Margetson. The pulpit, font, and reredos, together with the sculptured tympanum of the west door, are the work of Mr. R. Boulton, of Cheltenham. The altar-rails, pulpit-guard, font, cover, &c., are by Messrs. Brawn & Downing, of Birmingham. The gasfittings were supplied by Messrs. Singer, of Frome. The church is heated by hot air, the apparatus being supplied by Messrs. Haden & Son, of Trowbridge, and placed in a vaulted chamber. Care has been taken to guard against a recurrence of the catastrophe which destroyed the church, and the whole area has been arched in with bricks. The architects were Messrs. Hansom & Son; and the contractors Messrs. Wilkins & Sons and Mr. H. Brooks. Mr. T. Lewis was the clerk of the works.

*Alford.*—St. Wilfrid's Church, Alford, has been re-opened. The sum of 6,205*l.* 2s. has been expended on the restoration and enlargement of the church. The work has been done by Messrs. Hasnip & White, of Alford, under the superintendence of Mr. George Gilbert Scott. The plan of the church comprises a nave 59 ft. long by 20 ft. wide, divided into four bays by arcades of octagonal columns and deeply moulded arches, having north and south aisles 9 ft. wide, and a new north aisle 16½ ft. wide. The chancel is 44 ft. deep, by 20 ft. wide. A tower stands at the west end of the nave, and is 17 ft. square within. The entire length of the church is 125 ft. 6 in., and width 62 ft. There is a large porch on the south side, with vestry above for choristers, &c. The style adopted is Second-Pointed; the windows and other architectural details being, as nearly as could be ascertained, of the date of the original church. The arches of the nave and chancel are moulded, having foliated capitals, and moulded bases. The tracery in the chancel windows is to be filled in with the remnants of the old stained glass. The roofs are open, of high pitch, stained and varnished. The chancel roof is of stained oak, in the wagon-head shape. The seats are all open, of pale oak, with the ends carved, of three different designs, and fixed on a wooden floor; the middle aisle is flagged with ancient tombstones. The other aisles are paved with black and red tiles, unglazed, from Godwin's works at Lugwardine, near Hereford, each in different design. The windows are glazed with pale green cathedral glass, in small diamond frames. The roofs are covered with pale Westmoreland slates, having moulded stone ridges, the cable ends being surmounted by pinnacles and crosses, of various designs. The new doors, of pale oak, are hung on wrought-iron hinges, from the Mediæval metal-works of Messrs. Peard & Jackson. The gas standards are also from the same firm. The new organ, by Messrs. Forster & Andrews, of Hull, has been erected in the new organ chapel, at a cost of about 400*l.*: the case is of oak, carved. The church is to be heated by four stoves. The east window in the south aisle is about to be filled with stained glass, by Mr. Lister Wilson. The dark green sandstone used is from the quarries at Worlaby, and has been presented by Mr. A. Nelson. The light stone for the angles, window-mullions, &c., is from the Ancaster quarries. The new gargoyles, and beads on the corbel stones, on either side of the doors and windows, have been carved by the Messrs. Ruddock, of London. The accommodation in fixed sittings is for about 600, but the church is capable of accommodating about 750 persons.

## DISSENTING CHURCH-BUILDING NEWS.

*Huntingdon.*—The site of the old Dolphin-yard, which for many years past had been a disgrace to the town, has now reared upon it a spacious and elaborate Nonconformists' church, known as Trinity Church. The structure is completed. The building is situated in about the centre of High-street, and the style is Early Decorated. The tower has four pinnacles and windows, surmounted by a spire, with carved arches, rising above the level of the pavement 190 ft. The contract amounts to 7,817*l.*, exclusive of warming and lighting. Mr. J. Wrighton, Godmanchester, has executed the mason's work. The church is arranged at present for about 720 sittings on the ground-floor.

*Gainsborough.*—A new chapel in connexion with the United Free Methodists has been opened in Hickman-street. The chapel is partially built of concrete, with brickwork here and there visible. It is 47 ft. long by 33 ft. broad, and will hold about 300 people. It is built from designs of Mr. T. Lister, architect, of this town, and the work has been carried on under his personal superintendence. Its internal fittings are not yet completed.

*Mere* (*Wilts*).—The foundation stone of the new Congregational Church, about to be erected by Mr. C. Jupe, as a memorial church, has been laid. The building will be in the late Early English style, and will have nave, north and south transepts, aisles, and polygonal apse at the east end, in which will stand the pulpit and communion-table. Galleries will be carried all round, except in the north transept, where the organ and choir will be placed. The clearstory will be carried on 6-in. iron columns. There will be three entrances, one by the south porch, one on the north side of the west front, and the principal one through a lofty porch, at the south-west angle of the church, so designed that it may be left as a porch, or form a suitable base for a tower and spire, should it ever be decided to build them. There will be accommodation for 350 persons on the ground-floor, and 220 in the galleries. The church will be heated by Messrs. Haden's hot-air apparatus. Mr. W. J. Stent, of Warminster, is the architect.

*Devonport.*—After undergoing extensive alterations and improvements, Princess-street Chapel has been re-opened. Two small galleries at the extreme end of the building which were almost useless have been removed, the porch has been widened by nearly 6 ft., and two rooms constructed on each side, one being for the minister's use, and the other intended as a class-room, separated from the chapel by a glazed partition. The pulpit has been entirely removed, and in its stead a platform erected, supported by ornamental pillars. The interior has been repainted, and the windows are frosted. The plans were supplied gratuitously by Mr. Andrews, who has also superintended the erection of the work by Messrs. Murch & Son, Stoke.

*Hythe.*—The new Congregational chapel has been opened for divine service. The amount of the contract was 1,925*l.*; but that sum will be increased by extras. The chief material of the building is rock, and the Gothic style of architecture has been adopted. There are two porches and a lobby at the entrance from High-street, and a dwarf wall, with iron railings and piers, extends along the front. The pulpit is formed by two raised platforms. Over the windows there is some ornamental stencilling. Mr. J. Gardner, of Folkestone, was the architect. Messrs. Candy & Gibbs, of Croydon, executed the carving.

*Willenhall.*—The memorial stone of a new

Wesleyan school chapel, to be erected on the Walsall-road, Willenhall, has been laid. The cost of the property, and the erection of this "school chapel," together with boundary walls, &c., will be over 750*l.*; but the building alone, which is to be of brick, and to accommodate about 250 persons, will only cost 300*l.* The building, as may be supposed from the cost, will be of a very unassuming character, and will be composed entirely of red brick, with facings of coloured brick; the only ornamentation being a front porch facing the road. The plans of the building were prepared by Mr. B. Baker, and the builders are Mr. John Taylor and Mr. Henry Hall.

## ROMAN CATHOLIC CHURCH-BUILDING NEWS.

*Market Rasen.*—The church here has been re-opened. The addition and alterations have been such as to have left scarcely any trace of the old building, so that it may be called a new church. The architects were Messrs. Hadfield & Son, of Sheffield. The edifice consists of a nave and north and south aisles. The north aisle and the baptistery at the end were built at the sole expense of Mr. Arthur Young, of Kingerby. The south aisle is terminated by a saddleback tower, and rises to a height of more than 70 ft.; it is crowned by a figure of our Saviour on the cross in stone. The nave is divided from the aisles by pillars of stone with carved capitals. The arches are of brick in alternate bands of white and red. Over the high altar hangs a canopy, and at the back a large crucifix; the sanctuary is laid with encaustic tiles of simple design; the communion-rail is of oak with wrought-iron standards, painted and gilt. The gas standards are of nine lights each. At the east end over the lady altar is a window representing the angel Gabriel appearing to the Virgin Mary. It is from the works of Messrs. Laver, Barraud, & Westlake, of London.

## STAINED GLASS.

*Habberley Church.*—This church has just had erected a new east window, the gift of Mr. F. T. Sparrow. The window is in the Early English style, consisting of three lights of stained glass, by Mr. Preedy, of London, and represents six scenes in the life of Christ, and that of the Virgin Mary. The subjects are as follows:—The Annunciation, the Nativity, the Presentation in the Temple, the Flight into Egypt, the First Miracle at the Marriage in Cana, and the Crucifixion. The stonework, also new, is carried through the thickness of the wall, and has been executed by Mr. R. Smith, of The Clive.

# Miscellanea.

Cumberland and Westmorland Archæological Society.—A meeting of the members of this society has been held at the Crown Hotel, Penrith. Major Whitwell, of Kendal, occupied the chair. The Rev. J. Simpson read a paper sent by the Rev. John Maughan, on the "Supposed Roman Stations at Kirksteads, Burgh-upon-Sands, and Bowstead Hill." Dr. Michael Taylor then read his paper on "The Vestiges of British Occupation near Ullswater, and on the Discovery of Buried Stone Circles by Eamont side." The company afterwards luncheoned in another room. Nearly the whole of the ladies and gentlemen present then proceeded in carriages to Dacre Castle, where a descriptive account of the old castle was read by Dr. Taylor. After the reading of this paper, the company dispersed in various directions. The day was very favourable for the excursion, and all seemed to enjoy themselves. On leaving Dacre, the company drove over to Pooley Bridge, and ascended the famous Dunmallet, about which reference was made in Dr. Taylor's paper, and where there is one of those singular entrenchments, with a mound outside the ditch, which have been observed in other parts of the country, as in Cornwall. The Dunmallet earthwork stands on high ground, Dunmallet rising to a considerable height from the margin of a lake, and the ditch and mound occupying the summit. The company returned to Penrith, after spending a very pleasant and agreeable afternoon.

The late Sir Cusack P. Roney.—The life of this gentleman was an eventful one, and, properly written, would be instructive. He was born in 1810, was educated at Trinity College, Dublin, and took his B.A. in 1829. He was a member of the College of Surgeons; secretary to the Royal Literary Fund, 1835-37; a clerk in the Admiralty, 1840-45; secretary of the Eastern Counties Railway, 1845-51; secretary of the Grand Trunk Railway of Canada, 1853-60; and was knighted by the Lord-Lieutenant of Ireland (Earl St. Germans), for his able management of the Dublin Exhibition in 1853. His skill as an organizer was great. His genial manners and ready kindness endeared him to a large circle of friends.

Boiler Explosion at Wolverhampton.—Inquests have been held on the bodies of six men who were killed at a recent boiler explosion at Moseley Steel and Iron Works, Wolverhampton. The jury returned a verdict of "Accidental death." The foreman of the jury also handed in the following recommendation: "We are of opinion that the explosion was accidental; but we think that if a proper inspection of the boiler had taken place the accident would not have happened. We are of opinion that a boiler of the same make as the one which exploded is not safe with the amount of heat which was worked into it. We think that proper steam gauges should be used, and regular inspection of the boiler by a competent person should take place."

The Atherstone Sewage.—The local sewage committee have resolved, "That the tender of Messrs. J. & J. Smith, of Hanley and Newcastle, for contract No. 1, 2,410*l.*, be accepted, subject to the proper filling in of the schedules, and references proving satisfactory to Mr. Latham, the engineer;" also, "That the tender of Messrs. Skey & Co., of Wilnecote, for contract No. 2, 558*l.* 4*s.* 11*d.*, be accepted, according to the specification, upon the recommendation of Mr. Latham; and that Messrs. Skey & Co. be called upon to enter into a written contract according to their schedules of prices." It appearing that Owen-street was included in the system of the sewerage, it was resolved that the same be included, and that work be executed by the contractors, under Mr. Latham's direction, upon their schedule of prices.

Monument to the late General Bruce.—A monument to the late General Bruce, governor to the Prince of Wales, and brother of the late Earl of Elgin, who was plenipotentiary to China, is being erected in Dunfermline Abbey. It is an altar tomb, on the panels of which are commemorated, in bas-relief, the chief incidents of the journey to the Holy Land made by the Prince of Wales under the guidance of the deceased. One of the scenes portrays the departure of the pilgrims from home; the next indicates their arrival at Jerusalem; while in the third the Prince is tending the general in his illness while in Palestine. On the top of the tomb lies an effigy of the general, sculptured after the fashion of Mediæval church monuments. The figure of his widow is represented in the attitude of mourning. The Prince of Wales's plume, on the corner of the pillow which supports the head of the general, was suggested by her Majesty, to serve as a memento that the general had breathed his last within the precincts of St. James's.

Steam from the Sun's Heat.—Captain Ericsson undertakes to supply a new source of heat in place of coal, oil, &c. For several years he has been experimenting with the view of collecting and concentrating the radiating heat of the sun, with which, so to speak, to heat his furnace. At length, at the beginning of the present year, he was able, according to his statement, to construct three "solar engines," of which the first was driven by steam formed by the concentration of the heat of the solar rays; and the other two by the expansion of atmospheric air, heated directly by concentrated radiant heat. His experiments show, he asserts, that the concentration of solar heat on 10 ft. square, or 100 square feet of surface, developes a power exceeding one horse's power. We are curious to learn the exact nature of the concentrating mechanism. A Mr. Dellamater declares that the enterprise is already a success, and that, "before the termination of the present season, bread will be prepared from flour ground by the power of the 'solar engine.'" Hitherto, however, Captain Ericsson's ingenious caloric inventions have not been found available on a large scale as practical machines.

Re-opening of the Parish Church, Twyning.—Two years ago the roof of this church was in a dangerous state; the walls were crumbling; the interior was filled with old pews of various sizes, heights, and patterns; the whole was dreary and comfortless; and there were no funds from which to repair it. A sum of 2,300*l.*, however, has now been expended on the structure, which has been formally re-opened.

Inscription on a Sun-dial.—On a silver sun-dial, in front of Stanwardine Hall, in the parish of Baschurch, Shropshire, is the following inscription:—

"In the hour of death (Dial) For as tyme doth haste
God be merciful to me; So lyfe doth waste."

"He that will thrive
Must rise at five;
He that hath thriven
May lie till seven;
He that will never thrive
May lie till eleven.
Anno 1560."

Standwardine Hall is a remarkable old mansion.

The proposed Municipal Offices, Bradford.—At a discussion in the town council on this subject, wherein motions, amendments, substantive motions, and movements of adjournment, succeeded each other in such perplexing involution that not even the movers seemed to comprehend the actual fate of their own motions, it has been finally resolved,—

"That it is not expedient at present to proceed with the erection of public offices; and further, that it be an instruction to the Street Improvement Committee to offer for public auction, in such lots as they may determine, the land known as the Chapel-lane site, and that the resolution of the 3rd of September, 1867, with reference to such offices, be, and the same is, rescinded accordingly."

When the corporate wisdom had virtually brought the matter to this pass, the mover of the successful resolution rose, and said he should leave the game in the hands of his opponents; and he was on the eve of taking his departure at this point, when, amidst considerable laughter, he was made aware of his mistake. Some one should move a radical "amendment" of the council's mode of voting.

Church Window Opening. — An apparatus patented by Mr. Beard, of Bury St. Edmund's, has been so fitted to St. Mary's Church in that town, according to the local *Post*, that a lad or woman can now from the west end of either aisle open simultaneously and without noise ten of the clearstory windows to any extent that may be wished, and with equal ease shut them close and firm. A hollow tube of galvanized iron, about 1 in. in diameter, runs on the outside of the entire length of the clearstory windows along the sills, and is worked longitudinally by an endless screw, small iron roller-wheels being fixed at intervals to facilitate the motion. Upon the tube are affixed small jointed arms, which are attached to the windows, and acted upon with precision by the screw, the motion being conveyed by a weighted pulley and a cord, which passes from the roof to the floor of the church. In the case of St. Mary's, Bury, the length of tube on each side of the church is 130 ft., total 260 ft. The number of windows opened on each side is ten.

Discovery of another Roman Villa, near Painswick.—At a spot known as Highfold Farm (to be found in the Ordnance map), the remains of a villa have accidentally been discovered while ploughing. Mr. Adey, proprietor and occupier, has covered it in and levelled the ground again for the winter crop, purposing next summer to re-open it. A hypocaust was found, with square columns of brick (pilæ), supporting the incumbent floor, flue tiles (fumaria), running up the side walls, and a tesselated pavement (tesserulæ), also roofing-tiles (tegulæ), of pointed hexagonal shape of red sandstone. Mr. D. T. Niblett, F.S.A., in writing as to the hypocaust, &c., discovered, says,—"I strongly suspect that these hollow floors, raised in this way upon piles of bricks, or short columns, and arranged for the circulation of hot-air beneath, were not invariably belonging to the bathing apartments, but, as frequently, to the ordinary day-rooms, or maybe these particular rooms were used for both purposes. Moreover, these hollow floors are the most highly ornamental ones throughout each villa. While on the subject of square flooring bricks (lateres, or laterculi) size, say about 1 ft. square and some 2 in. or 3 in. thick, I would call attention to their occurring in Gloucester Cathedral in several places, set vertically in the Norman work."

National Exhibition of Works of Art at Leeds.—The visitors in the week ending Saturday, the 3rd inst., numbered, by season tickets, 5,505; by payment, 24,605; total, 30,110.

Lundy Island.—The granite quarries in Lundy Island are now no longer worked, and the company is being wound up. The works were started in 1863, and 30,000*l.* have been expended upon them.

Fever in Liverpool.—A sudden and extensive epidemic fever has broken out in country places near Liverpool, on the north bank of the river. The number of cases has, according to the *Medical Journal*, been very large. The deaths in the affected places, of which Bootle is one, have for the last six or seven weeks been nearly, if not quite, double the average.

Presentation of a Testimonial to the Oxford City Surveyor.—Upon the removal of Mr. T. C. Clarke, C.E., the late assistant borough engineer of Portsmouth, to Oxford, in consequence of his election as the surveyor of that city, it was determined to present him with some suitable recognition of the services rendered to Portsmouth during his residence there. The testimonial, which consisted of a French clock and a purse of fifty guineas, was lately presented, after a dinner at the Bedford Hotel, Landport. The mayor presided. The guest of the evening, Mr. Clarke, occupied a seat on the right of the chairman.

The Lord Mayor Elect.—Many of our readers will hear with great pleasure that Mr. Alderman James Clarke Lawrence will be the next Lord Mayor of London. His brother, Mr. Alderman W. Lawrence, M.P., was Lord Mayor in 1863. Mr. Alderman J. C. Lawrence became alderman of the ward of Walbrook upon the demise of Mr. Alderman Wire in 1860, and filled the office of sheriff two years afterwards. He is a very good speaker and a cultured man, and we have every reason to expect that the duties of his important office will be well and gracefully performed. He has the advantage of coming after a year of great flatness in the Mansion House.

The Estimate and Tenders for St. Swithin's Church, Lincoln.—The lowest tender having been found to be 1,059*l.* above the estimate accompanying the selected design of Mr. James Fowler, and above the sum proposed by the committee to be expended, three of the competing architects, Messrs. Goddard & Son, Drury & Mortimer, and Bellamy & Hardy, have written to the committee calling upon them either to return the selected plans to their author and make a new selection from the remainder, according to the instructions, or to permit them to furnish other designs to include the extra sum required to carry out the design selected. The three firms named also state in their letter that they believe their designs could have been carried out in their entirety, including the seats, for the stipulated sum. The tenders given in were as follow:—Patterson, Ruskington, 9,721*l.*; Wallis, Rasen, 9,600*l.*; Slingsby, Lincoln, 8,600*l.*; Lovelee, Branston, 8,559*l.*

The School of Art, Bradford.—The report of the School of Art Committee of the Bradford Mechanics' Institute, with which this school is connected, says,—"In presenting to you a report as to the art classes in connexion with your institution, under the charge of Mr. Sowden, we would first congratulate you on the greatly improved condition of the art education of the pupils as compared with last year. The collection of drawings and models which have been submitted to us is a remarkable proof of this, and not only is the general collection better, but the prize drawings are of a higher character than the prize drawings of last year. The numbers attending the classes have also increased, and in several of the branches competition has been so close that it has been difficult to adjudicate between the productions of the competitors." It was stated at the annual *soirée* by the president, in reference to a project for the erection of a new building for the institute, that the entire estimated cost of the new enterprise was 25,000*l.* The sale of the old building and ground and other financial arrangements enabled the committee to see how the half of that sum could be covered, and they required 12,000*l.* or 12,500*l.*, towards which their fellow-townsmen had already contributed 5,000*l.*

Royal Horticultural Society.—The Exhibition of edible and poisonous fungi, held on Tuesday last by this society, was most remarkable. Contrary to the expectations of the council, several hundreds of freshly-gathered specimens, in excellent condition, were sent for exhibition, nearly all the wholesome and deleterious kinds finding a place on the tables. Dr. Bull, of Hereford (in the absence of the Rev. M. J. Berkeley), delivered an able address on the subject, passing each species in review, both edible and poisonous, and giving his personal experiences of them. Prizes had been previously offered for the best collections by Lady Dorothy Nevill and Mrs. Lloyd Wynne. The first prize was awarded to Dr. Bull, and the second (that given by Lady Nevill) fell to the share of one of our contributors, Mr. Worthington Smith.

The Liverpool Master Builders' Association.—The second annual meeting of this Association has been held in their rooms, South Crescent-chambers, Lord-street, Liverpool; Mr. Thomas Haigh, the president, in the chair. The report for the year just ended was read and adopted, and the course which the committee had pursued in reference to the late strike of operative bricklayers was approved, the committee being complimented upon the successful issue of a contest of the bricklayers' own seeking. It was stated that the operative bricklayers who are members of the trades union are now anxious to have arbitration, and to be reconciled to the employers, after framing another code of trade rules; but the time for these negotiations, it was conceived, had gone by. They were the terms which the employers offered, and the bricklayers refused last May. Now the masters' workshops are plentifully supplied with men, and if at any time either party desire an alteration of rules, they provide for arbitration. The present number of the members of the Association is 174, and they comprise nearly all the influential employers in the building trade of Liverpool. Mr. John Jones, of the firm of Jones & Son, was unanimously elected president for the ensuing year.

## TENDERS.

For alterations and erection of chapel, at North Surrey District Schools, Anerley. Mr. J. Berney, architect:—

| | |
|---|---|
| Sawyer | £1,843 0 0 |
| Faulkner | 1,799 0 0 |
| George | 1,790 0 0 |
| Baxter | 1,770 0 0 |
| Crabb & Vaughan (accepted) | 1,729 0 0 |
| Housegood | 1,712 0 0 |
| Wills | 1,711 0 0 |

For pulling down and rebuilding two houses in Dove-row, Shoreditch. Mr. William Mundy, architect:—

| | |
|---|---|
| Marr | £1,266 0 0 |
| Tolley | 1,007 0 0 |
| Langmead | 990 0 0 |
| Christoffer Brothers | 897 0 0 |
| Higgs | 772 0 0 |

For Christ Church District Schools, Eastbourne:—

| | |
|---|---|
| Ford & Attwood | £3,767 0 0 |
| Nightingale | 2,953 0 0 |
| Dabbs | 2,547 0 0 |
| Fuller & Longley | 2,450 0 0 |
| Peerless | 2,260 0 0 |

For new 7-in. water-main, for Chelmsford Board of Health. Mr. C. Pertwee, surveyor:—

| | Pipes. | Labour. | Total. |
|---|---|---|---|
| Dence | ... | ... | £1,158 0 0 |
| Weston | ... | ... | 949 0 0 |
| Everett & Son | £669 10 0 | £249 10 0 | 919 0 0 |
| Bugbird | 645 0 0 | 224 0 0 | 869 0 0 |
| Tanner | 655 0 0 | 210 0 0 | 865 0 0 |
| Coleman & Co. | 645 0 0 | 194 0 0 | 839 0 0 |
| Dennis & Scruby | 547 10 0* | 288 0 0 | 835 0 0 |
| Christy | 605 2 0 | 210 0 0 | 815 2 0 |
| Thornton | 656 0 0 | 159 0 0 | 815 0 0 |
| Stevens | 627 17 4 | 173 0 0 | 800 17 4 |
| Wells, Smith, & Wright | 673 5 0 | ... | ... |
| Bailey, Pegg, & Co. | 638 15 0 | ... | ... |
| Tice | 620 15 0 | ... | ... |
| Newton, Chambers, & Co. | 620 15 0 | ... | ... |
| Butterley Iron Company | 615 10 0 | ... | ... |
| Begg | 607 12 6 | ... | ... |
| Warner & Co. | 607 12 6 | ... | ... |
| Graham & Son | 603 5 0 | ... | ... |
| Roberts | 601 1 6 | ... | ... |
| Cockrayne, Grove, & Co. | 594 10 0 | ... | ... |
| Reidy & Co. | 590 10 7 | ... | ... |
| Claridge, North, & Co. | 582 2 9 | ... | ... |
| Laidlaw & Son | 563 0 0 | ... | ... |
| Bower | 547 0 0 | ... | ... |
| Chandler & Sons | ... | 188 0 0 | ... |
| Walker | ... | 185 0 0* | ... |

* Accepted.

For a new Congregational church, at New Brompton Kent, for the Rev. J. Harsant. Messrs. E. Habershon & Brock, architects:—

| | |
|---|---|
| Manley & Rogers | £2,620 0 0 |
| Simpson | 2,523 0 0 |
| Scrivener & White | 2,169 0 0 |
| Naylor | 1,978 0 0 |
| Nightingale | 1,972 0 0 |
| Stump | 1,950 0 0 |
| Falkner | 1,734 0 0 |
| Wilkins | 1,700 0 0 |

For the erection of a mortuary, for the guardians of the poor of the parish of St. Pancras:—

| | |
|---|---|
| Turner (accepted) | £277 0 0 |

For new Metropolitan Police-court, Lower Kennington-lane. Mr. T. C. Sorby, architect. Quantities by Mr. John Scott:—

| | |
|---|---|
| Hill, Keddell, & Waldram (accepted) | £6,386 0 0 |

For new premises for Messrs. Negretti & Zambra, at Holborn Viaduct. Mr. F. W. Porter, architect. Quantities by Mr. James Williams:—

| | |
|---|---|
| Tanson | £9,635 0 0 |
| Carter & Sons | 9,570 0 0 |
| Mansfield & Co. | 9,099 0 0 |
| Patman & Fotheringham | 8,985 0 0 |
| Jackson & Shaw | 8,660 0 0 |
| Conder | 8,599 0 0 |
| Piper & Co. | 8,597 0 0 |
| Hill, Keddell, & Waldram* | 8,588 0 0 |

* Accepted.

For building new offices, for Messrs. H. & V. Nicholl, Lewisham. Mr. E. H. Badger, architect:—

| | |
|---|---|
| Amer | £685 0 0 |
| Jerrard | 649 0 0 |
| Pain & Baldy | 635 0 0 |
| Beaton | 625 0 0 |
| Penny | 555 0 0 |

For detached villa residence at Woodford, for Mr. Branscombe. Mr. G. R. Noble, architect. Quantities by Messrs. Linsdell & Giffard:—

| | |
|---|---|
| Rivett | £1,793 0 0 |
| Piper | 1,723 0 0 |
| Hedges | 1,690 0 0 |
| Hill, Keddell, & Waldram | 1,637 0 0 |
| Perry (accepted) | 1,625 0 0 |

For repairing and painting the interior of the parish church, St. John of Wapping. Mr. S. M. Pipe, architect:—

| | |
|---|---|
| H. & J. Johnston | £298 10 0 |
| Rolls | 298 10 0 |
| Jackson | 292 9 6 |
| Thompson (accepted) | 230 0 0 |

For the erection of a new wing and alterations to Park Villa, West Dumpton, Thanet, for Mr. Sinclair. Mr. John R. Collett, architect:—

| | New work. | Old work. |
|---|---|---|
| Osborne | £940 0 0 | £197 0 0 |
| Kelson | 889 11 4 | 170 0 0 |
| Duckett | 882 0 0 | 167 0 0 |
| Wade | 812 10 0 | 117 0 0 |
| Lawson | 780 0 0 | 160 0 0 |
| Elgar (accepted) | 744 0 0 | 150 0 0 |

For two semi-detached houses, Nottingham-road, Eastwood. Mr. J. Tait, architect:—

| | |
|---|---|
| T. & H. Herbert (accepted) | £820 0 0 |

For alterations, &c., to the Coopers' Arms, Silver-street, City, for Mr. Doughty. Mr. R. Washington Hart, architect:—

| | |
|---|---|
| Baugh & Lawrence | £505 0 0 |
| Kelly Brothers | 496 0 0 |
| Langmead & Way | 458 0 0 |
| Prince (accepted) | 445 0 0 |

For alterations to the George and Dragon, New North-street, W.C., for Mr. Weatherly:—

| | |
|---|---|
| Knight (accepted) | £150 0 0 |

Nor additional works at the Norfolk Arms, Hart's-lane, Bethnal-green, for Mr. Keymer:—

| | |
|---|---|
| Langmead & Way | £196 0 0 |
| Knight | 125 0 0 |

For enlarging and restoring Denver Church, Norfolk. Mr. William Smith, architect:—

| | Oak Seats. | Deal Seats. |
|---|---|---|
| Bennett Bros. | £1,623 0 0 | £1,450 0 0 |
| Brown | 1,459 0 0 | 1,348 0 0 |
| C. Bennett | 1,450 0 0 | 1,290 0 0 |
| Drake | 1,398 0 0 | 1,296 0 0 |

Accepted for the erection of a Wesleyan chapel and school, at Redcar. Mr. J. Hunter, architect. Quantities supplied:—

| | |
|---|---|
| *Bricklayer and Plasterer's Work.* | |
| Scott | £519 0 0 |
| *Joiner and Carpenter's Work.* | |
| Watson | 435 0 0 |
| *Mason's Work.* | |
| Lord | 175 0 0 |
| *Slater's Work.* | |
| Harrison | 97 14 0 |
| *Plumber, Glazier, and Gasfitter's Work.* | |
| Kershaw | 87 0 0 |
| *Heating Apparatus, &c.* | |
| Cunningham & Co. | 39 0 0 |
| *Painter's and Stainer's Work.* | |
| Guy | 28 17 0 |

For building coach-house and stable at Leytonstone Mr. William Mundy, architect:—

| | |
|---|---|
| Cains | £365 0 0 |
| Arber (accepted) | 244 0 0 |

For harbour works, Carnarvon:—

| | |
|---|---|
| Bugbird (accepted) | £24,470 0 0 |

The water and drainage works here, at a cost of 23,000*l.*, have just been completed by the same contractor.